November/December 2008 >> Vol.40

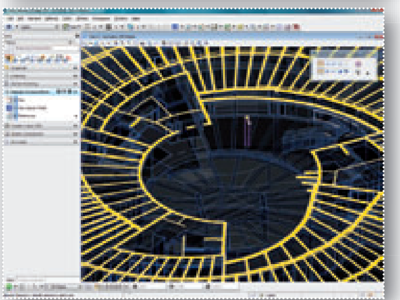
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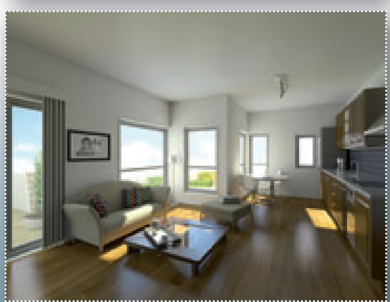
DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

Keith Bentley

The man behind MicroStation V8*i*





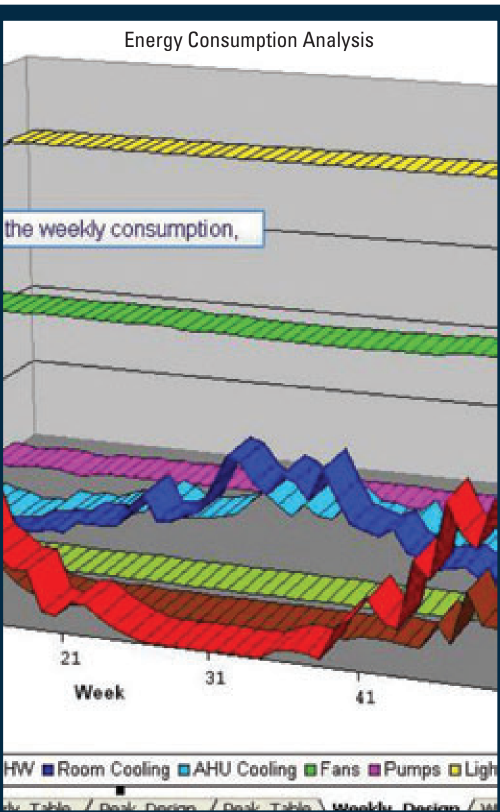




AceCad introduces Fabrication Information Modelling (FIM)

The real impact of Autodesk Revit in the UK

Bentley Building Performance



Energy Consumption Analysis


Image courtesy of CH2MHill B-WPantex-HVAC Design


Airflow Visualization

ENERGY ANALYSIS AND SIMULATION, FOR HIGH-PERFORMANCE BUILDING DESIGN

Rapidly growing worldwide demand for high-performance buildings means the ability to accurately predict energy consumption, CO2 emissions, operating costs, and occupant comfort is now critical to the success of projects ranging from the small and simple to the very large and highly complex. It also means architects, building services engineers, and energy assessors need the right tools to effectively and productively design, analyze, and simulate building energy systems.

Bentley's building performance software applications, including Bentley Building Mechanical Systems, Hevacomp and Tas, provide the fastest, most powerful, and most accurate simulation and analysis available for building load, plant energy, passive design, and dynamic thermal simulations. Supporting ISO, CIBSE, and ASHRAE standards, these industry-leading tools can be used around the world to provide required compliance checking and documentation, such as that mandated by U.K. part L2, Australia part J, and USGBC's LEED program.

Bentley's comprehensive suite of tools helps today's professionals productively deliver sustainable high-performance buildings.

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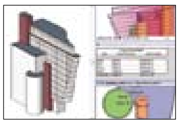
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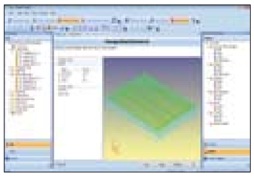
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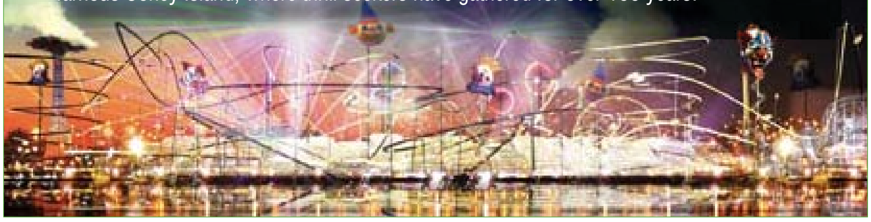
Vol.40: Contents

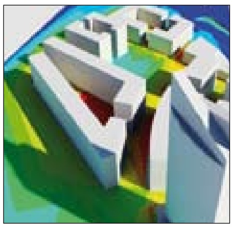












Virtual construction software to link to Revit



Vico Software has announced that its 5D Virtual Construction solutions and services, which are designed to help reduce risk, manage costs, and optimise schedules on large, complex building projects, will be integrated with Autodesk's solutions for the AEC industry. According to Clay Freeman, chief product officer at Vico, the initial focus of the partnership has been integrating Vico's Virtual Construction Suite with Autodesk Revit, though Vico has not yet announced a date for availability. ***www.vicosoftware.com***

CAD Box puts print management in its place

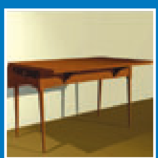


Ratio has launched its new CAD|STATION print management solution for the technical print market. CAD|STATION Box is an 'out of the box' print management solution that is designed to help large format printing operations optimise output from all printers in the organisation. Key features include, full job costing, online backup system and support for all major CAD and graphics file formats. CAD|STATION Box is now available from Art Systems. ***www.artsystems.co.uk***

Union Square launches Workspace ix

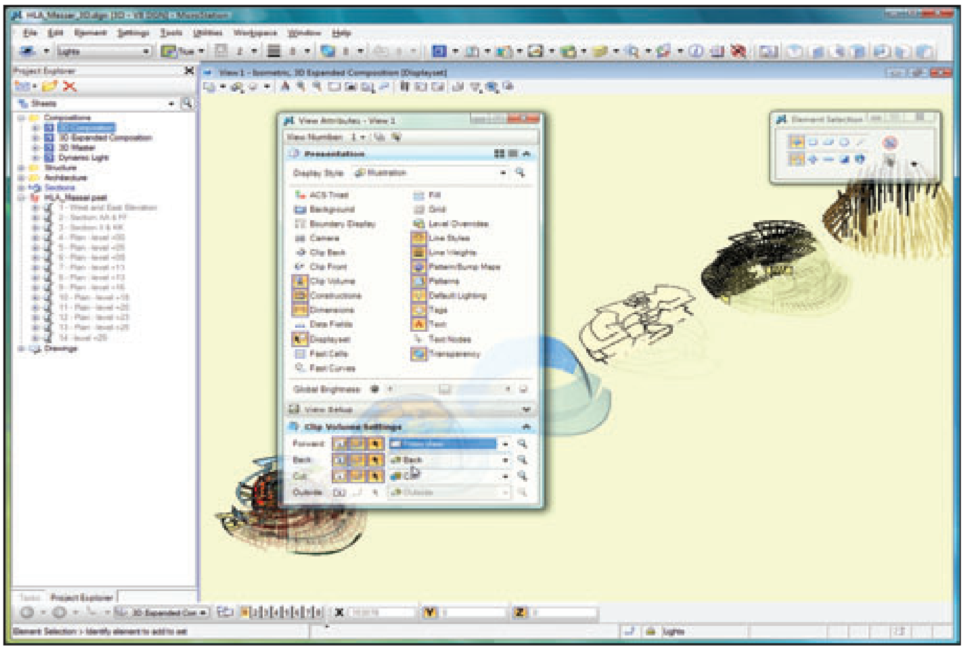
Union Square has launched a new version of 'Workspace', the web-based information sharing portal, specifically designed for the construction industry. Workspace ix provides a variety of new features and facilities along with a new user interface. It is designed to help firms within the architectural and construction industries manage information effectively and avoid the problems that occur with traditional storage systems when valuable business documentation and correspondence is lost or misfiled. ***www.unionsquaresoftware.com***

Online ArchiCAD library harnesses GDL viewer



Objectstop.com, a specialist online international database of ArchiCAD objects & plugins, has added Graphisoft's GDL web control viewer to its site. This allows customers to use and control GDL objects from their browser as if they were already in their ArchiCAD file and take a much closer look the objects before purchase. ***www.objectstop.com***

Bentley announces V8i portfolio



Bentley has unveiled what it claims to be the biggest release in the company's history. Developed as a collective whole, the V8i software portfolio is designed to streamline workflows among the many disciplines that Bentley serves, including, engineering, architecture, GIS, and construction.

The latest V8i MicroStation release can be boiled down to five main features: intuitive design modelling, interactive dynamic views, intrinsic geo-coordination, project performance, and iterative Luxology rendering.

Intuitive design modelling is designed to enable users to transition from conceptual modelling and visualisation to fully completed architectural and engineering models in a single environment. Intrinsic geo-coordination aims to ensure that all V8i projects include the real-world location of the infrastructure site.

Interactive dynamic views are designed to make working in 3D much more interactive and more informative. Employing something called "display sets," V8i users are able to change the way different parts of a 3D model are displayed in the same working view to interactively visualise and resymbolise 2D and 3D designs in real time.

Increased project performance is said to be made possible through accelerated file transfer between locations – with 10x performance gains being the claimed norm for average files sizes – and full read/write integration with Microsoft SharePoint provided for improved overall usability. Additionally, the new Luxology rendering engine incorporated in the MicroStation product and all MicroStation-based applications provides near-real-time rendering in the design application, claims Bentley.

Meanwhile, turn to page 8 for an exclusive interview with Keith Bentley, CTO, Bentley Systems. ***www.bentley.com***

IES delivers early-stage environmental analysis

Integrated Environmental Solutions (IES) has released two new suites of integrated sustainable analysis tools – the Architectural Suite and the Architectural Suite Plus. These two new offerings provide architects with early-stage environmental design assistance in a variety of categories, including energy consumption, carbon emissions, daylighting, solar shading and artificial lighting, enabling them to perform customised analysis for each project.

The environmental analysis tools are integrated around a central 3D model that can connect directly with Google SketchUp, Autodesk Revit and with other 3D design tools via gbXML. Utilising these suites, IES claims that architects can quickly and easily incorporate environmental performance analysis into their design workflow without rebuilding geometry. Multiple design iterations can then be assessed to help maximise the environmental performance of the final design. ***www.iesve.com***

Direct 3D printing available from AutoCAD



Autodesk is partnering with a number of organisations to enable AutoCAD users to link directly to 3D printing service providers to speed the production of physical models.

Delivered with the latest Bonus Pack to users on subscription, AutoCAD will take customers' 3D data, convert it to the industry-standard standard STL format and then send it to a chosen provider of parts. Once the physical model is made it will be popped in the post and delivered to the client.

One such service is called ZPrints which is the result of a partnership between Z Corporation (using its colour 3D printing machines) and Quickparts, a leading rapid prototyping service provider. Quickparts is able to provide 'instant online quotes' for the manufacturing of custom models. ***www.zcorp.com***


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Excitech receives Autodesk training centre award

Excitech has been named as UK Autodesk Training Centre of the Year 2008. Selected by the Autodesk Customer Learning team, Excitech has been awarded the status based upon both compliance with the Autodesk Training Program and the quality of feedback given by delegates. ***www.excitech.co.uk***

ODA introduces legacy application recovery

The Open Design Alliance (ODA) is introducing a new service for CAD developers and end-users to implement DRX support for obsolete or legacy ARX custom object applications developed with the Autodesk ObjectARX programming environment. The service will allow users to convert obsolete ARX applications into current DRX applications, which are usable within any DWGdirect host application. According to the ODA, this opens a wide range of possibilities for CAD developers and end-users to work with more recent DWG file formats and to further develop and enhance their custom object implementations. ***www.opendesign.com***

Nemetschek turns 'green' with new partnership

Nemetschek is the latest BIM software developer to address the need to improve building energy efficency. The developer of Allplan has teamed up with Stuttgart-based 5S AG with a view to developing new software solutions to make environmentally-friendly design and construction as simple and efficient as possible. Nemetschek Allplan and 5S AG will develop solutions that will help architects and engineers determine buildings' energy needs and create energy performance certificates. As well as quantities and costs, users will also be able to derive data for evaluating energy efficiency from the virtual building model. ***www.nemetschek.com***

OrthoGraph delivers new survey tools for PDA

Orthograph Survey and OrthoGraph Architect are two new PDA-based graphical survey software tools. The OrthoGraph software supports the floor-plan sketching and measurement of flats, buildings and even large enterprise portfolios. It can be used on its own or together with Leica Disto A6 laser distance meter. ***www.orthograph.net***

Blom Aerofilms delivers high resolution aerial images of London



Blom Aerofilms, a pan-European provider of geographic information, has announced the capture of new aerial images of central London with the highest resolution currently available.

While typical aerial images are available in 25cm and 12.5cm resolutions, the newly created orthorectified datasets come at 4cm resolution. These are said to provide a visualisation and modelling resource that enables architects, urban planners and property developers to simulate a real world context for future design and development considerations.

The high resolution detail visible in the imagery can be overlaid with asset data or other user information to enable more informed decisions to be made. Blom Aerofilms can also provide controlled stereo pairs for customers to produce their own mapping, digital terrain models or highly detailed 3D cityscapes.

"Blom Aerofilms is committed to providing new and innovative aerial data that meets the ever increasing needs of our customers," said David Critchley, Managing Director of Blom UK. "We are really excited about the level of resolution we have managed to achieve. Whilst it is bound to raise a few eyebrows, we guarantee the imagery is 4cm resolution and has not been sub-sampled. In fact, at its Western extent, the proximity to Heathrow forced us to fly so low it is actually 2.5cm resolution."

This new 4cm imagery dataset complements the existing Blom Aerofilms aerial imagery solution, which comprises oblique and orthographic images of over 120 towns and cities across Great Britain and 1,000 cities across Europe. Whilst capturing the 4cm imagery Blom Aerofilms has also acquired high resolution 50cm LiDAR data for the same area in London, which is also available from Blom Aerofilms for a wide range of architectural, engineering and urban planning purposes.

www.blompictometry.com/4cm.html

Google brings CAD-style 'objects' to SketchUp

SketchUp 7 and SketchUp Pro 7, the latest versions of the easy-to-use 3D modeller from Google, which is particularly popular with architects, are available for download from ***sketchup.google.com***. SketchUp 7 features a number of new tools to help users express their ideas better and more easily in 3D and also share their work and collaborate more effectively.

Drawing inspiration from more high-end 3D CAD applications and available in both SketchUp 7 and SketchUp Pro 7, Dynamic Components are 3D models that are aware of what they are and behave like the real-world objects they represent. A dynamic staircase, for example, knows that it is a staircase, and not just a shape designed to look like a staircase. Using the Scale tool on this staircase will automatically add or remove steps as you make it bigger or smaller.

In terms of enhanced collaboration, the Google 3D Warehouse, an online database of millions of 3D models, can now be searched from within the SketchUp 7 component browser, making the process of finding, downloading, and using existing models of anything from the Golden Gate Bridge to a dining room table easier.

There are additional features for SketchUp Pro users. LayOut 2, now out of beta, is a tool for creating and sharing professional presentations made from SketchUp models. LayOut 2 allows users to share hard-copies of their work and transfer models from SketchUp to paper, enabling them to print 3D items in a newly dynamic and detailed fashion. SketchUp Pro 7 users can author their own Dynamic Components, creating their own fully customized, interactive 3D models.

SketchUp 7 is available for free download at ***sketchup.google.com*** while SketchUp Pro 7 can be purchased online for $495. Meanwhile, 3Dconnexion has announced SketchUp support for its 3D controller. ***www.3dconnexion.com***

CADline aims to speed design-to-fabrication cycle

Autodesk Premier Solutions provider, CADline, has been accredited to supply and support Fabrication for AutoCAD MEP, a new fabrication design package created specifically for AutoCAD MEP, by Massachussets-based software firm, East Coast CAD.

AutoCAD MEP is a discipline-specific version of AutoCAD software for mechanical, electrical and plumbing (MEP) designers. It is designed to help increase accuracy and efficiency in the design of construction documents and facilitate collaboration throughout the industry.

According to Amar Sekhon of CADline, the arrival of Fabrication for AutoCAD MEP will help save costs and drive collaboration further, "In the past, AutoCAD MEP's functionality didn't really extend beyond the design stage; the contractors' work was created separately. Now, with Fabrication for AutoCAD MEP, the original design information data can be taken right through to construction saving time and money. It's like automatically handing the relay batten onto the next runner."

www.cadline.co.uk

Keith Bentley on MicroStation V8*i*

Bentley has just released the latest version of its flagship product, MicroStation, along with a comprehensive portfolio of applications for infrastructure. AEC Magazine interviewed Bentley's chief technology officer (CTO), **Keith Bentley,** on the advances made in this new version, which is called V8*i*.

Martyn Day: The PR around MicroStation V8*i* claims it's the biggest release of MicroStation in the company's history. The same was said of V8 when it was launched. What have been the challenges?

Keith Bentley: From this point on, I think each of our releases will be 'the biggest release' for us as we grow and make more acquisitions. One thing about this release compared to, say, MicroStation V8 XM Edition, is that while there was a lot of big stuff in V8 XM, some of its main benefits were for our applications. V8*i* is the company's largest effort to date to get together the most programmers releasing the most code, affecting the majority of our products, being deployed by the largest number of our users.

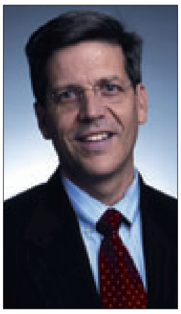
So, it has been a concerted release with many more moving parts that all had to come together. I think our users will end up looking at V8*i* as a major breakpoint in the portfolio of Bentley products. In the V8*i* portfolio we have a lot of products that are used by a lot of people, and the products are interconnected.

I don't necessarily expect immediate adoption of V8*i*, because I don't think overnight everyone is going to say, 'I have to upgrade everything to V8*i*.' However, when an organisation does say, 'Now is the time for us to move to V8*i*,' they won't have anywhere near the issues they had in the past making a number of products work together. V8*i* is a big release for us. I'm sure in our press communications we say this about every release, but I really do look at this release as a big one!

MD: With the release sounding like such an effort, customers may worry about the upheaval of upgrading.

KB: As you can imagine, I've been through a lot of releases and talked to many users about trying to encourage people to upgrade. As you know, in every software upgrade there comes some pain and some gain – hopefully more of the latter. In V8*i*, I think the gain-vs-pain ratio is very high. For example, I think the pain point addressed by the ProjectWise 'Delta File Transfer,' and the pain of slow file transfer that it solves, is bigger than the feature sets of a lot of previous generations. Companies can deploy V8*i* and literally the next day their projects are going to run much smoother. Moreover, the features and benefits in MicroStation V8*i* translate into profitability for our customers. We're very excited about that.

MD: The MicroStation release has been boiled down to five main features: intuitive design modelling, interactive dynamic views, intrinsic geo-coordination, integrated Print Organizer, and iterative Luxology rendering. What's new, what's updated, and what's been licensed.

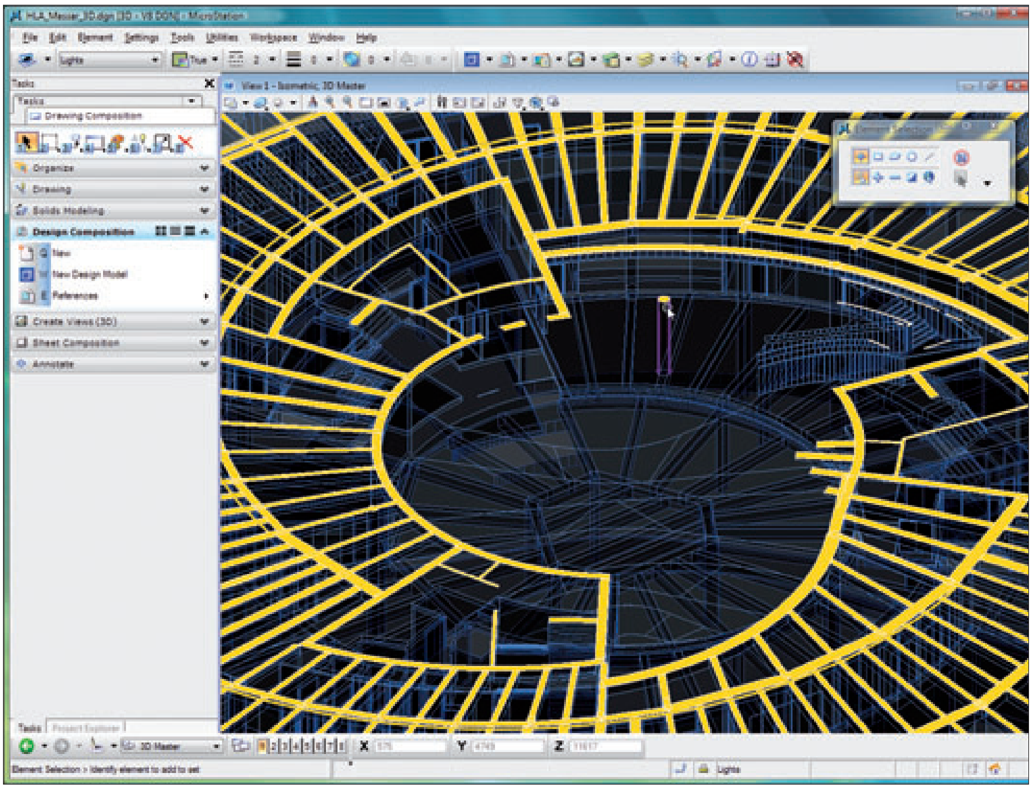


Keith Bentley, chief technology officer, Bentley.

KB: I think each one has important benefits to offer our users and there's a combination of new, updated, and licensed. For example, we licensed the rendering engine from Luxology. The integration of that technology with MicroStation and with our vertical applications is going to change our market in much the same way that the digital camera changed the film market.

Twenty years ago, there were professional photographers, who were very good at using a 35mm camera and at developing their own film. Photography was an art, and when you saw a really cool picture you were impressed.

Nowadays, people take a hundred pictures and if one of them turns out well they toss the other 99





Bentley's work on the Massar Children's Discovery Centre. Courtesy Henning Larsen Architects.

and, in their minds, they are photographers. In terms of the way visualisation will be used in AEC projects, having something that's directly and easily accessible to all users – and fast – will fill an important need. One of the key features of Luxology is that it does a really good job amazingly fast. So, like with a digital camera, I think a lot more people will use it and become good at it.

The other items in the list of features are improvements or brand new content. Take, for example, dynamic views. Most people will compare dynamic views to Revit drawing extractions or synchronisation techniques. In differentiating between what we've done with dynamic views and what Revit does, you need to understand that dynamic views use the same referencing capabilities that MicroStation has pioneered for a long time. The most important thing about that is the biggest downside with Revit: When you're trying to keep your drawings in synch with your model, it all has to be stored in one place – you're always facing a limit of how big a project can be or how distributed a project can be. With MicroStation, you can subdivide the project whatever way you want and have as many files as you like. And with V8*i*, we've taken the best of both worlds.

If you're in a session of MicroStation and have, say, 30–40 files that are all being referenced, and you need to edit some of them, in the past with MicroStation and AutoCAD there was one lock on one file. Now we can modify multiple files and have a transaction that spans multiple, independently lockable files. This is a big thing. You can have a large project spread across multiple offices and multiple computers and files.

MD: Tell me a bit more about the new conceptual modelling tools — what have you done there to expand MicroStation's capabilities?

KB: We recognise that there are some incredible opportunities for using GenerativeComponents with other modelling tools: drawing modelling, component modelling, parametric modelling, even sketchy-type modelling tools. The cool thing is, we have made them all work together. In V8*i*, our objective was to make it so that in a distributed team, where people focus on aspects of the project using each of those techniques, when everyone comes together to collaborate, their work is all shared in DGN files.

In the past, we've had people spending resources using a tool like SketchUp. SketchUp is a great tool,

"I think there's a lot more to the Bentley V8*i* release than Autodesk has in all its AEC products put together."

For V8i, Bentley has licensed the Luxology rendering engine, which Keith Bentley believes will make visualisation directly and easily accessible to all users.



and it's been used by a number of our users. People say to us, 'Can't you make SketchUp work better with MicroStation?' and, yes, we do a pretty decent job of importing and exporting SketchUp files. But, we're going to make those people much more productive by enabling them to use the powerful referencing, raster, point cloud, etc. tools in MicroStation. In other words, they can now use in their conceptual modelling, all the features that drive their decision to pick MicroStation for their engineering project.

From an interface perspective, the goal was to make V8*i* easy to learn and use, for the people who say, 'I don't want to learn MicroStation,' or 'I don't want to install every application on my desktop; I just want to use SketchUp.' So we focussed on coming up with ways that you can use MicroStation and turn off all the features you don't care about and just use it in a simplified way. Similarly, for users of GenerativeComponents, in MicroStation they are going to find themselves in that nice, easy environment, sketching in 3D mode, until they get to the point where they want to add more precision and use some feature modelling. Once they've crossed into the solid modelling world, then they can use solid modelling techniques.

With V8*i*, with improved DGN referencing techniques, it will all seem pretty seamless. The two main scopes of our company — comprehensive and integration — are coming together in this world of design modelling.

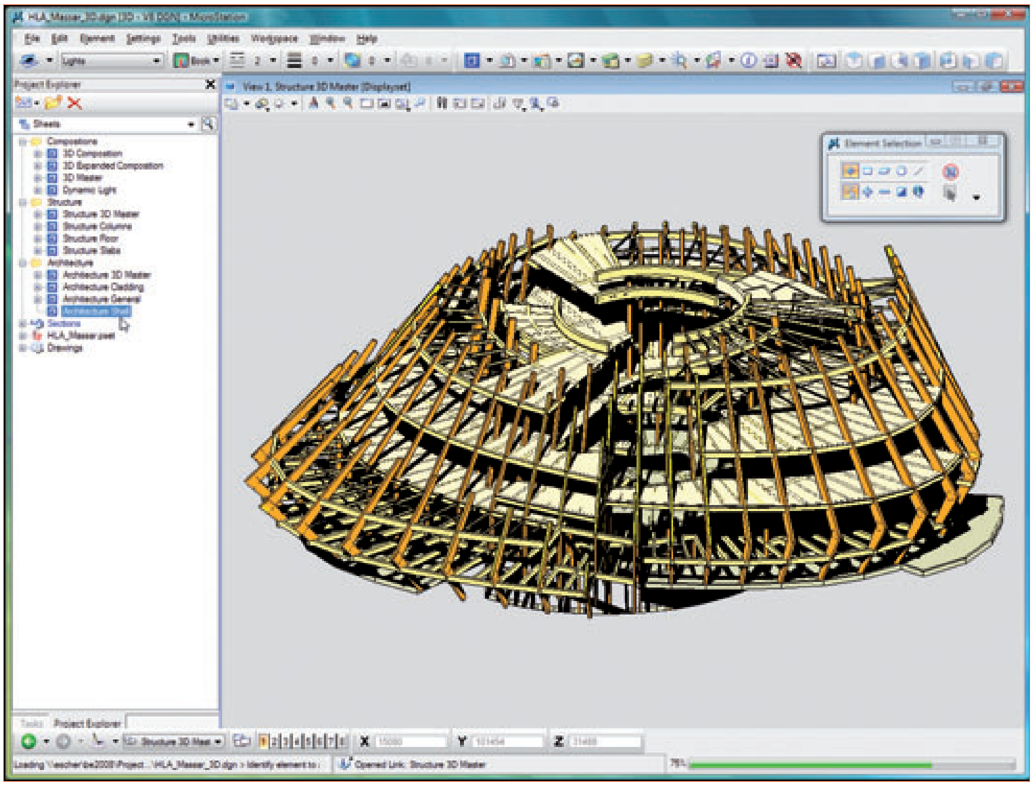
MD: Is V8*i* the first version based on a new foundation? Or are the foundations still being built?

KB: No, V8*i* is the first version based on the XM foundation.

A lot of our modelling tools, structural analysis tools, and building energy analysis tools have releases that are part of our V8*i* rollout. In fact, we now have the biggest array of solutions in the AEC industry – literally. I think there's a lot more to the Bentley V8*i* release than Autodesk has in all of its AEC products put together.

Plus, it all works together. In fact, we created something called the interoperability platform. In reality, that mostly happened in the XM release. So in XM, we started taking the parts of MicroStation, the parts of ProjectWise that are shared across lots of other applications, creating this programming tool kit that many programmers can use. But in XM, it really wasn't deployed very well – there wasn't much that you could hold out as being of benefit for the user. But in V8*i*, a lot of our products incorporate the engineering interoperability platform.

So is V8*i* the first release on the new platform? V8*i* is actually the second release of the new platform. But when we got XM together, we didn't have enough time to put any real meat behind all those new techniques



Bentley's work on the Massar Children's Discovery Centre. Courtesy Henning Larsen Architects.

and subsystems, beyond just getting it to work as it did before.

The platform was born in the generation that created XM, but most of our products didn't roll out on it. The XM generation spanned multiple releases of MicroStation and our vertical products.

MD: You called V8*i* the integration platform for your vertical products. Could you explain a bit more what this means?

KB: Yes. I referred earlier to the interoperability platform that now exists in the V8*i* platform. One reason it exists is that when newly acquired companies would come to us and ask, 'Now that we're a part of Bentley, where do we go to download the integration tools that we use to do this or that?' we didn't have a simple answer to their question.

Frankly, every time we did an acquisition I was embarrassed by the involved explanation for how they could integrate with our other products. Everyone in a newly acquired company typically is very enthusiastic about being a good corporate citizen and just wants to know what they need to do to become one.

Our answer before V8*i* was: 'It ain't that easy.' Now we have a solution.

MD: Are you happy with Windows Vista as being a steady platform for CAD, or is it still an incredibly overweight, fat, system-hungry? What about 64-bit?

KB: I think Vista has a bad reputation now, which frankly isn't really deserved. I hate to be labeled as a Microsoft sycophant because there are a lot of things that I wish they'd do better. But, for MicroStation, Vista is the best choice.

Perhaps the biggest problem we've had is switching from OpenGL to Direct3D, which we didn't necessarily have to do, but we did. Direct3D under XP can perform poorly when the user has two screens — and a lot of MicroStation users have two screens. If you switch to Vista, the dual-screen support is definitely better.

The 64-bit debate is two years out of date now. On a 64-bit operating system, MicroStation can take advantage of a lot more of the extra addressable memory. At this point, if you're configuring a new computer, there aren't really many reasons to install the 32-bit operating system. With the 64-bit version, you won't run into as many problems with big models. Of course, with small models it doesn't matter, but the distinction between small and big changes every year.

MD: The DWG/DGN announcement with Autodesk was probably the biggest announcement to hit the industry since CAD was invented. Obviously, it hasn't made it into V8*i* because the announcement happened so late in the development cycle; but what timeframe are you going to be slipping that in?

KB: The Open Design Alliance (ODA) toolkit that we use now does a pretty good job of emulating a lot of what's in AutoCAD's DWG format. Actually, the concept mismatches between MicroStation and DWG are now fairly few. Converting to Real DWG really isn't as big a job to implement engineering-wise, but it certainly will require a lot of testing. We've put a lot of work into making sure that when you're editing a DWG file in MicroStation, you're editing the MicroStation content and keeping all the DWG content updated concurrently.

I would guess you're going to see us implement Autodesk's Real DWG in a 2009 release of V8*i*.

MD: Have you handed to Autodesk your MicroStation API in return?

KB: Yes. They have our library, and we have theirs.

MD: Do you have no fear about what they're going to attempt do with the DGN access?

KB: I think we recognise that they are going to be able to do as good a job with DGN as they want to. So file formats will not be either our or their differentiator. If anything, I think good DGN support in AutoCAD might be an advantage for us and our users. The MicroStation user will have the enviable luxury of saying, 'Here's your DGN' when they work with other people who have AutoCAD.

MD: So have you relinquished your membership in the ODA?

KB: No, we are still members of the ODA. We still use their library; in fact, we're still shipping it today. Yes, we're going to replace the DWG library that we use in MicroStation, but we're still a member of the ODA. We support them in their creation of the Open DGN libraries that they have developed from our published DGN specification documents.

MD: What's the future of the ODA's Open DGN format now?

KB: We answer the ODA's questions, but they don't get any source code from us. We merely give them documentation about the format.

MD: There's a lot of talk about cloud computing. Is there a space for CAD and Bentley in this cloud service based world?

KB: I think there will be, specifically some of the analysis type applications that aren't particularly interactive. I don't necessarily think that most of what people think of as 'CAD' applications will translate into cloud computing very well. But analysing data that you create, and even some data that you use in that model (e.g., environmental conditions), can be done via shared 'cloud' resources. The theory of shared computing resources is old, but I think it's the future as well.

MD: Bentley's Enterprise clientele and subscription models are very different from Autodesk's volume play. Moving forward, is this likely to fundamentally change?

KB: Bentley's business model is an important factor in how we go about creating products and the way in which we target acquisitions. Our model is based on long-term relationships. Our subscriptions model is part of our DNA. We're really motivated by things that marry us to users and make it a win-win.

If people using our products are successful, they are more likely to continue to subscribe to our programs so they can get more enabling technology through us. Our Enterprise License Subscription has been one of the most successful things we've done in the last ten years.

If you want to predict the way in which Bentley will go, we're focused on an ever-increasing scope of 'things that people use when designing, building and using infrastructure'.

We're not necessarily looking for license revenue; we're looking for ways to partner with people and make them more successful.

www.bentley.com

David and Goliath

Paul Woddy of www.revitguru.com looks at the adoption of Autodesk Revit and discovers that hard user numbers are difficult to find.

It is hard to imagine that there are people out there in the AEC market, who have not yet heard of Autodesk Revit or defined a Building Information Management (BIM) adoption strategy for the short, medium or even long-term, but the education of an entire industry is a mammoth task and I guess I will be explaining it for many years to come yet.

The commonly used benchmark for measuring market penetration in the AEC industry is AutoCAD, which has, over 25 years, reached a position of dominance which will be hard to assail. With this precedent, it is no wonder that after only eight years, Revit has still got some way to go to break out into the real world and become a household name as AutoCAD is.

I imagine that as subscribers to AEC Magazine you, the reader, will have been well informed of the technology and its journey to date but that is not to say that you have made the leap and adopted it.

If you asked the top 20 architectural practices in the UK whether they have Revit, I would guess that 18 would say yes, as most of these organisations have at least one copy of most bits of software in this arena, but what is the actual picture? How many of those top twenty are using it as the primary design tool? How has Revit adoption progressed and what momentum has it built up? Is it being used seriously in the industry and to what extent?

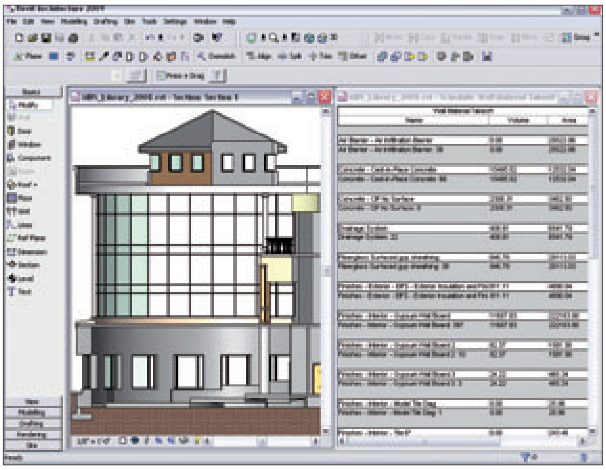
One question that I think should be a key addition here is whether, as Revit sales increase, we have another ADT on our hands, whereby the numbers look impressive but the reality of feature adoption is very different — using ADT as if it were AutoCAD anyone?

Well to answer the last question first, obviously Revit is not DWG-based and therefore this problem should not be as prevalent, but is Revit used as another drafting tool or are the principles of BIM being incorporated into the design process? Anyone who has been inflicted with my teachings will be familiar with the idea that the important letter in the BIM acronym is the 'I' — Information is the key, and Revit is an information capturing system.

I always suggest that the text tool should be a last resort, as any information should be added to the element and then tagged out, ensuring consistency, quality and co-ordination. The text tool is equivalent to bringing along a stick and a hoop to the Olympic cycling race. I promise that this is relevant to the subject, as many adoptees of BIM are still to fully embrace this aspect and unleash the full potential.

Murky waters

Autodesk keeps most of its Revit sales figures very close to its chest. Asking Autodesk staff outright will



result in a pause and an 'Erm...' and then a redirection to the latest press release, which states, for the record, that the 200,000 milestone has been reached. This does not tell us too much (often because the Autodesk employees are not entrusted with the figures either) and certainly does not shed light on the UK situation, so we then have to turn to anecdotal evidence.

So who do we speak to for evidence? Well, I can tell you that 100 per cent of the companies I deal with have made some commitment to move to Revit in the next 12-18 months. However, as I am a deployment consultant and only deal with clients implementing Revit perhaps we need to look further afield.

I could also list a number of big name clients, representing hundreds of copies of Revit, which could provide some very impressive name-dropping, but apart from the fact that permissions would mean the article would never see daylight, it proves little. Of more interest is the move to Revit by contractors and owner/operators, who see virtue in information management and will ultimately be the winners in this adoption.

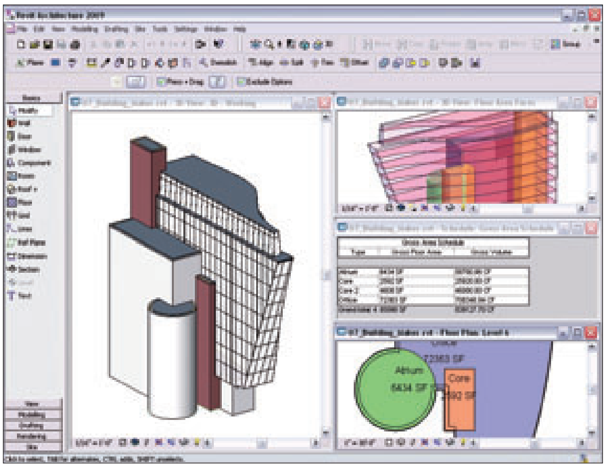
James Brown is the civil and structural engineering manager for Asda stores, responsible for ensuring timely and cost-effective production of design information. James has confirmed that it is an Asda objective to have all projects designed entirely within Revit by 2010.

Many companies say they have made some commitment to move to Revit in the next 12-18 months.

The important letter in the BIM acronym is the 'I' — Information is the key, and Revit is an information capturing system.

Asda's implementation of Revit has so far brought considerable benefits in sharing project requirements and design intent across the entire team. Further benefits have been gained through the generation of material quantities driven by parameters in the model components. By 2009 all structural design will be carried out in Revit moving to all design and quantities management by 2010. Asda has identified the following specific benefits as key points for its commitment to Revit technology:

- Early production of material quantities based on actual project requirements rather than approximations.
- The ability to optimise cut and fill requirements from a project for the most efficient use of the site, and to minimise material transportation.
- Client requirements are easily translated to the design and construction teams through better co-ordinated project documents.
- Significant reduction in clashes between construction elements, which result from the geometric clash detection and visual appraisal of the model as the design progresses.
- All design teams are able to work more closely together by sharing design models, and thereby improving cross discipline co-ordination.
- Additional benefits that will ensue for the future will include the ability to use existing Revit models to evaluate feasibility of future alterations and expansions, and to assist in appraising maintenance requirements throughout the building lifespan.



Conclusion

Although Asda has only a small internal requirement for design products, its influence on the design market can be huge. Asda is indicative of several organisations that are collectively responsible for vast swathes of the built environment, and which are looking closely at BIM and what it brings to them. I could have copied many quotes from Autodesk case studies to write this article, or even gathered similar sound-bites from architectural and engineering clients, but in my mind, it is the likes of Asda that will provide the biggest push in the adoption of Revit — hopefully without too much use of the text tool.

A breath of sea air

James Pugh of DJD Architects tells how a contemporary interpretation of local influences creates a striking residential scheme for Bexhill-on-Sea.

Home to the De La Warr Pavilion, the UK's first public building built in the Modernist style, Bexhill-on-Sea is a seaside town at the heart of British contemporary architecture. Its Victorian and Edwardian architecture is studded with 20th Century buildings, which look to Modernism for their architectural lead.

This was the inspiration for DJD Architects when it was commissioned to redevelop a site occupied by a sprawling, much extended, hostel complex that had been unoccupied and neglected for some time. The existing buildings had fallen into disrepair and were now beyond economic refurbishment and conversion: the site was an eyesore.

Situated within an almost exclusively residential area, housing was seen as the logical option for regeneration of the site. However, in order to make the scheme financially viable it was going to be necessary to develop it to a higher density than is common for the area. DJD's architectural response was a Modernist-inspired design that features two residential blocks with a large garden space between. The scheme echoes the De La Warr Pavilion with its white facades and flat roofs. In the larger block a central atrium is curved in plan, a feature also similar to the entrance on the Grade 1 listed pavilion.

Practice makes perfect

DJD employs over a dozen people in a strong design team that draws on diverse backgrounds and experience. The practise undertakes predominantly residential architecture in the private and social sectors, with further projects in the commercial, retail and ecclesiastical fields. It has used ArchiCAD for the past eight years for production of CAD documentation, including all design and technical 2D information. The software also provides the added visualisation and design benefits brought by working in 'automatic' 3D.

ArchiCAD's 3D approach allowed massing proposals for the site to be developed quickly at the outset of the project, easily permitting evaluation in the 3D environment, to assess the buildings' impact on neighbouring properties: this included issues of overlooking and whether views to a local landmark would be lost from adjacent buildings. Once these basic principles were established, additional detail was worked into the scheme in order to develop the full proposals for the planning application. Automatic co-ordination of plans, elevations and 3D views gave complete confidence that the drawings were up to date.



DJD's concept centred on a modernist-inspired design that featured two residential blocks with a large garden space in between.

Architectural links

With a 3D model that is intrinsically linked to the scheme, 'sketch' views of the model could quickly be generated by the design team to bounce off the client, planning consultant and planning officer. In this way valuable discussions could be had with much greater certainty of the effect that would result from changes, and of course those changes could be incorporated and reviewed much more quickly than with a separate 2D/3D workflow.

Using the technology enabled DJD to integrate visualisation features in order to produce plans, elevations, rendered views and Quicktime VR's of the scheme for planning purposes and also to display at a public consultation event. The Quicktime VR movies were particularly valuable because they allowed members of the public to orbit around the scheme and view it in context from all angles.

The resulting designs incorporate sustainable measures including rainwater harvesting and ground source heat pumps. The scheme is set in landscaped grounds with residents' parking carefully hidden in secure underground facilities. The local authority has resolved to grant planning permission for the 70 one- and two-bedroom apartments including 28 affordable homes spread over the sloping site.

With its white facades and flat roofs, the scheme echoes the De La Warr Pavilion, a Grade One listed building situated on the coast of Bexhill on Sea.



Managing success

This architectural design was managed in ArchiCAD by developing each block within its own file — allowing the buildings to be rationally orientated for a more straightforward workflow — and a simplified storey structure that only needed to relate to the one building. Repetitive elements such as flat types were maintained as modules so that changes to the module would update all instances of that flat type.

Publisher sets were used in the building files to enable easy output of module files containing specific model elements, for example the building envelope only with no furniture, to be hotlinked into the context file. Changes to the design were then easily re-published and updated within the context file.

The integrated 3D workflow in model-based architectural design is particularly useful in informing discussions with all parties during the development of the scheme, as sketch views could quickly be generated and distributed while work on design alterations continued. These images were felt to be of great benefit by the planning officer dealing with the scheme and were a valuable aid to successfully achieving planning permission. The ability to generate 3D views without duplicating effort in maintaining 2D and 3D workflows saved a great deal of time and co-ordination.

The technology proved itself to be the ideal tool to aid the smooth development of the proposals and we received compliments from both client and planners for the way in which the three dimensional information positively influenced the evolution of the scheme. The result is a successful design for Bexhill-on-Sea that is both new and environmentally considerate, while also being of a style that works well within the town's mix of architectural styles.

www.graphisoft.co.uk
www.djdarchitects.co.uk

Cutting a good figure with BIM

Amsterdam-based architectural firm 3D Blueprint is using Building Information Modelling to build better and at lower cost through effective co-operation.

The journey into ones self or your body is a dream that is shared by many people, and previously could only be experienced in the cinema. But that changed this Spring with the opening of the Corpus Museum in Oegstgeest, The Netherlands. Visitors can take an active journey through the human body from head to toe and find out 'in situ' how we work.

This is made possible thanks to a 35 metre-high figure of wood and steel that flanks the narrow side of the glass museum structure. Designed by PBV Architecten, construction of the building was a particular challenge, which the commissioned designers from 3D Blueprint Architects & Engineers overcame with flying colours. Thanks to Building Information Modelling (BIM) and Allplan BIM from Nemetschek Allplan, the Amsterdam-based architects were able to complete the building on time and even remained below the planned budget.

Building Information Modelling relates to the consistent use of a virtual building model across all phases and disciplines of design, construction and management. Thus, BIM makes it possible to design construction projects that are less costly, contain fewer errors and are more efficient in meeting deadlines than is the case with conventional planning methods. This is exactly what Joep Esser and Wubbo Hazewinkel had in mind when they founded their company six years ago, and they have used BIM and Allplan BIM from the very start: "3D Blueprint's goal is to build better and at lower cost through effective co-operation," explains Joep Esser, managing director of the company.

The 35 metre-high figure of wood and steel flanks the narrow side of the Corpus Museum in Oegstgeest, The Netherlands.



The architects and engineers have developed their own working method for this, which they call the "Regiplan method".

In Allplan BIM's virtual building model, all project-relevant information is entered centrally and made available to all those involved across the complete planning and construction phase. The Nemetschek Allplan solution offers exactly the right range of features, as employee Persijn Bongers explains: "The software is so sophisticated and powerful that even the most unusual components can be saved as intelligent objects – an important prerequisite, if you want to work exclusively with BIM."

Cost cutting

The designers draw up the project requirements with the building client in advance in a 'building program', which formulates a clearly defined and feasible goal. An initial (basic) three-dimensional building model is created for this in Allplan BIM, which allows reliable statements to be made on quantities and costs on the basis of the assigned material properties. Economic factors can be taken into consideration from the start and tracked over the entire project period: "For decision-making, the coupling of planning and calculation of costs enables us to identify the lower-cost option and therefore counteract incorrect developments at an early stage," explains Mr Esser. "As a result, we are able to reduce the costs of a building project by 10–15 percent, for example, or to deliver a higher-quality building without increasing the construction costs."

The Amsterdam designers have already executed a number of projects successfully in this way, including most recently a new building for the Dutch Railroad Museum in Utrecht. The company now employs 50 people and has long been co-ordinating international projects.

3D Blueprint has made a name for itself as a specialist in integrated project planning, and was involved in this capacity in the Corpus Museum project. The company was, more or less, called in to save the day: because execution and design planning had been carried out completely removed from each other in 2D, a number of planning errors had already crept in after just a short time due to the complex shape of the building. As a result, costs had spiralled out of control. In order to bring things back on track in time, the building client, Heddes Bouw, handed over the entire project co-ordination, as well as tendering, project approval and project management to 3D Blueprint.

The planners soon got the project under control thanks to integrated project processing. All project information – that is, all geometric and technical data of all the companies involved – was merged and co-ordinated in a central Allplan BIM building model. In the first step, 3D Blueprint created the building and the human figure as a 3D model, and generated floor plans, views and sections from this.

A comparison of these plans with the steel construction data, which was imported to Allplan first in 2D and later as a 3D DWG file, brought a whole series of design errors to light. For example, there were points where the diagonal crosses of the reinforcing bonds ran exactly in front of doors, or the required heights for openings could not be adhered to because of the steel girders in front of them. By bringing together the various disciplines in one single data model, these problems could be identified long before the ground-breaking ceremony and corrected in good time.

"The software is so sophisticated and powerful that even the most unusual components can be saved as intelligent objects – an important prerequisite, if you want to work exclusively with BIM."

Persin Bongers,
3D Blueprint Architects & Engineers

This also applied for the building technology: once it had been ascertained that there was sufficient space for the required installations, all the installation plans were imported to Allplan BIM and checked on the basis of the execution plans. This was mostly done in 2D, but also in 3D at particularly complicated points, in order to identify potential collisions between steel structures, finishes and building installation immediately on the model and correct these where necessary. The building client and planners were therefore spared any unpleasant surprises on the construction site.

Made to Measure

In addition, information from the 3D model could be used to manufacture the corresponding steel elements with a precision fit and the elements could then be installed at the construction site without any additional work. The steel company took the construction data and added further production-relevant factors to the 3D model. This 3D model for the steel construction was then re-integrated in Allplan BIM via IFC and was then available as the planning basis for the wood structure, which together with the overlying metal elements, formed the external 'skin' of the figure.

In the end, a virtual building model was created in which all the key factors — relating to design, function, structure and production technology — were incorporated and optimised. It is an excellent example of Building Information Modelling with Allplan BIM and was a determining factor in ensuring that the museum could be opened on schedule by Queen Beatrix of The Netherlands, who had long had the date noted in her calendar.

www.3dblueprint.net
www.nemetschek.co.uk

Interview: Joep Esser, managing director, 3D Blueprint

AEC: What is the ideal construction process?
JE: In our opinion, it is important that project requirements are specified with precision and that the construction team subsequently implements these requirements. This means that all parties involved work together without interruptions in the flow of information. To achieve this goal, we count on Building Information Modelling, and on the Regiplan method developed by us. During this process, the building model in Allplan BIM functions as a central hub for all project information and technologies.

AEC: What are the benefits you derive from using Nemetschek's Allplan BIM?
JE: We consider Allplan BIM a very high-performance software that is quite mature as well. For example, this affects working with intelligent objects — a requirement for BIM. In addition, the software provides a multitude of options for defining attributions for construction elements and offers extensive data exchange options — both are crucially important for working with a central building model.

AEC: Does Building Information Modelling help you keep costs under control?
JE: Of course — from the very start of a project. In our initial draft, we already connect individual components of the 3D model with costs. This lets us find the appropriate architectural style while staying within financial requirements and specifications. As the project advances, coupling the building model with pricing helps us make well-informed decisions and counteract undesirable economic developments.

AEC: Does Building Information Modelling require a specific work method?
JE: We are convinced that a structured process is a prerequisite for effective project management with BIM. We do this with the Regiplan method that we developed ourselves. BIM then makes it possible for the architects to stay on top of all aspects of the project and take on the role of general contractor — very much like the original job description for architects.



Joep Esser: all parties involved work together without interruptions in the flow of information.

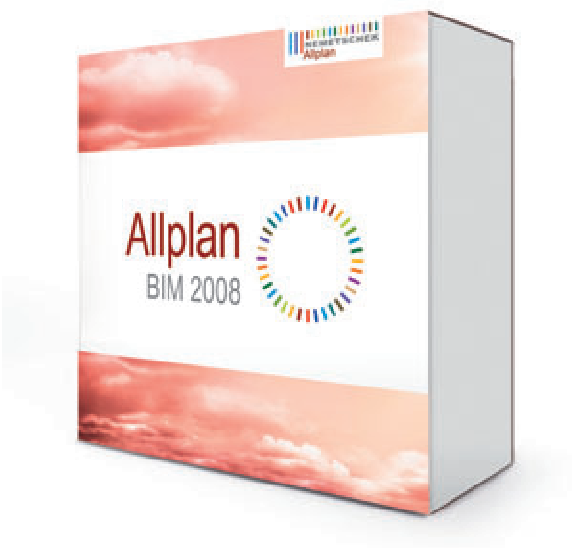
NEMETSCHEK

2D or 3D: Design Freedom with Allplan BIM 2008

Are you an AutoCAD LT 2006, 2007 or 2008 user and considering upgrading to another product? Then make the right choice and upgrade to a solution which provides everything you need. An intelligent CAD system that makes Building Information Modeling come to life. **Allplan BIM 2008 -** the fully integrated CAD solution for Architects and Engineers.

Special Offer: £1150* (incl. 1 day free training)

With Allplan BIM 2008, Nemetschek offers a powerful software solution with 2D drafting and 3D modeling through to intelligent building models with quantity takeoff, cost calculation and reinforcement design (optional) - in a single integrated application. Use Allplan the way you work, or best suited to your current project or design tasks. And with an integrated solution, you can implement the wishes of your client quickly and easily, helping you to perform even better.



Decide yourself, how you want to work. Allplan BIM 2008 gives you the freedom to work in 2D or 3D allowing you to easily switch according to your working tasks. And don't be afraid of data conversion! With Allplan BIM 2008 the exchange of data occurs comfortably to and from AutoCAD.

Nemetschek offers competent local partners who will gladly advise you. And by the way, feel free to also continue using AutoCAD LT if you want for your own purposes.

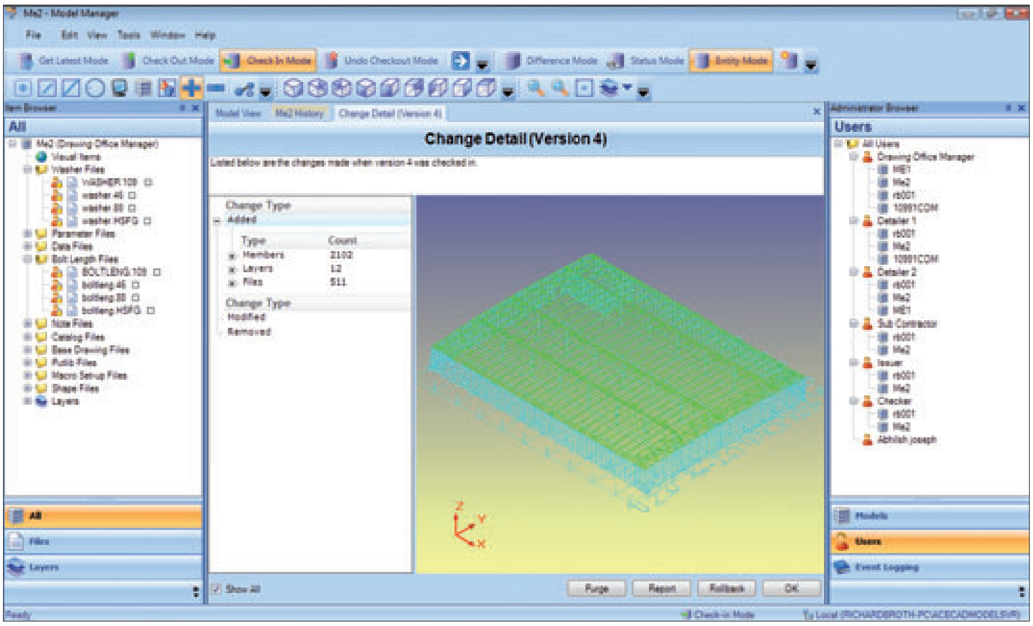
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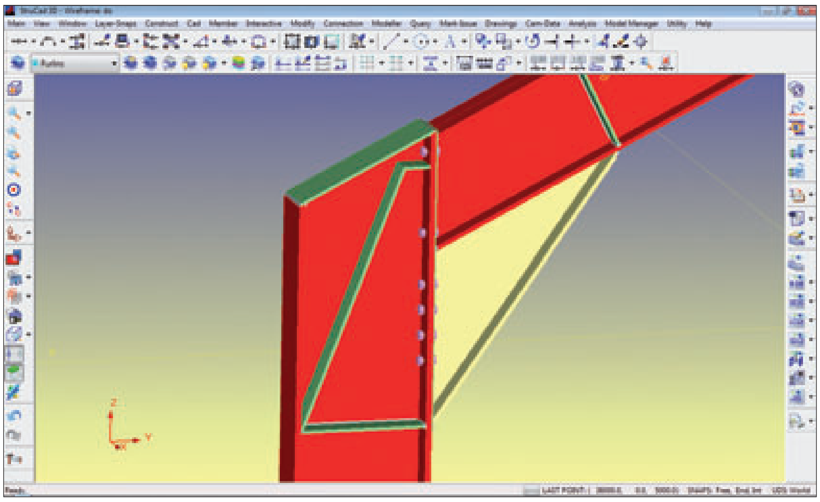
CADserve Limited | Rotterdam House | 116 Quayside | Newcastle upon Tyne | NE1 3DY | Tel. +44(0)191 206 4075, Fax +44(0)191 206 4001, fash@cadserve.co.uk, www.allplan.com

BIM for fabrication

Already having a mature product in terms of its structural steel modelling capabilities, AceCad is pushing its steel fabrication solution forward by introducing more efficient ways of managing the process from drawing office to site, writes **Greg Corke.**



StruCad's new Model Manager enables geographically dispersed teams to work on the same models using a check in/check out process.



Connection modelled in StruCad.

Building Information Modelling (BIM), every AEC software marketeer's favourite three letter acronym, is starting to gain some real traction in the industry. But when it comes to the structural side of BIM, more often than not, the process stops at the engineer.

When the likes of Autodesk and Bentley talk about structural BIM, it's typically about building a 3D structural model, taking it out for round-trip analysis, optimising the design, and then updating the model and automatically generating 2D drawings. But what about the process that follows – the fabrication of the structure — and the management of that process from drawing office and shop floor to site?

This next stage of the process is what Derby-based structural software developer AceCad Software, is calling Fabrication Information Modelling, or FIM for short. Andrew Manze, AceCad's sales director, explains: "Structural BIM concentrates on the engineer's role in the process, but FIM looks at the process from the perspective of the fabricator.

"FIM takes things further to its conclusion, to site erection — the guy on the shop floor who has bar-coded steelwork and needs to be able to manage the whole production process, or the production manager at a sub contractor who needs to manage all his procurement and supply chain, to order the correct stock and manage that process for each project."

AceCad's FIM offering is centred on the company's two flagship products, StruCad and StruM.I.S.NET. StruCad is one of the industry's leading 3D structural steel detailing solutions and is built around a powerful parametric engine. StruM.I.S.NET is an information management system, featuring a comprehensive suite of processing, tracking and reporting facilities.

Together they provide steel fabricators with an integrated solution with which to handle everything from modelling, connection design and detailing, through to enquiries and estimating, contract management, material procurement, stock control, and production tracking — all in real time from the moment it's been modelled to the moment it's been erected on site.

StruCad V15

AceCad's StruCad lies at the heart of its FIM process and enables fabricators to model entire steelwork structures in 3D — down to the last notch, plate and bolt — then automatically generate drawings, material lists, and CAM data. While this level of modelling/documentation functionality is a given for any steel fabrication solution, AceCad's recent development activities have concentrated on making the product much more in tune with the industry's changing landscape and global trend to outsource.

Just released this month, StruCad Version 15 includes a brand new Model Management system, which facilitates a controlled multi user environment. This has been developed to enable drawing offices to channel resources so staff can all pitch in and work together effectively on large and urgent jobs, or to enable drawing offices to outsource some of their modelling work overseas – and most importantly manage that process effectively, in different locations and even in different time zones.

"We needed a multi user environment where huge models can be broken down into chunks, but didn't want it to be a system where you had to be connected to a network all the time because in the steel fabrication sector a lot of the functions can be distributed over large distances," explains Manze. "Half may be modelled in England while the other half modelled in India or China, for example. It's just not practical to run a system that's connected all the time so Model Manager allows users to synchronise the data, over LAN, VPN or Web service."

The system works by allowing users to check in/out portions of the model (or a model envelope if the model doesn't yet exist) from a central server. Once checked out the 3D data can still be used as a reference by other users; but they can't alter the data.

With all this data being pushed around the globe over the Internet one might expect there to be issues with bandwidth. However, according to Manze, it poses no problem and this is down to the wire frame technology that underlies StruCad's modelling engine. "Wire technology sends lightweight data, which gets reconstituted into solids, so you're talking about tens of MB rather than 100s. Also, once the data has been sent, only the updates need to be checked back in."

The management process is controlled at administration level, not only in terms of the area that

is assigned to each user, but through the implementation of user levels, restricting exactly what users can do with their assigned areas, down to an individual part level.

Individual drawing office standards can also be managed with the system including material grades and borders, for example. Traditionally, if a contractor had a job on and needed some top-up capacity from a sub-contract drawing office, they'd have to provide all this information in a handbook. With the Model Management system, the contractor is able to set up specifications for the job and, if it is sub-contracted, all the standards are pushed down automatically through the system.

The administrator has the ability to look at a history of what's checked in (and out) and who the author is. StruCad provides a complete audit trail of everything that has gone on, right down to what's been issued, including loads and lots. Then, if later on it's identified that an error has been made in the modelling process, the whole model can even be rolled back to any point in time.

StruM.I.S .NET

While StruCad excels in its ability to model, detail and generate NC code and drawings, StruM.I.S .NET takes control of the fabrication process further downstream, managing estimates, contracts, inventory and suppliers, production and budgets. For this latest release the software has been re-written entirely in .NET to facilitate a more flexible, modern and faster platform on which to develop.

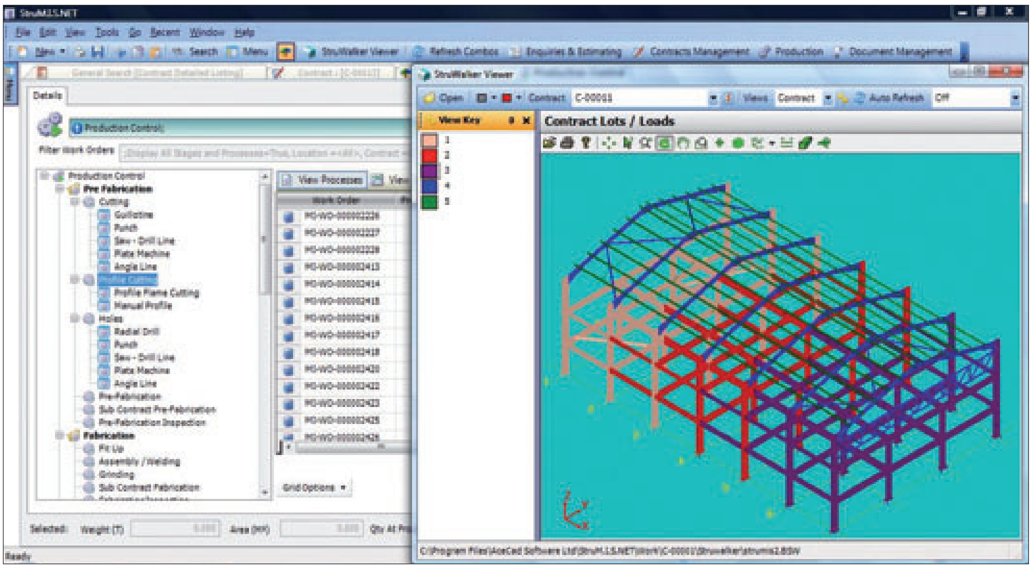
Estimating is a bit of a black art, and different fabricators have different ways of dealing with this part of the process. In essence, StruM.I.S .NET is able to manage individual tenders, taking off information from analysis, design and CAD models and supplementing/fine tuning this with material and labour, and additional on-site expenses such as crane hire.

Once a tender has been won, individual contracts can be compiled, based on key information such as material grades, paint specifications, phase, delivery dates, invoice dates, schedule of construction, and even who gets to retain any scrap material.

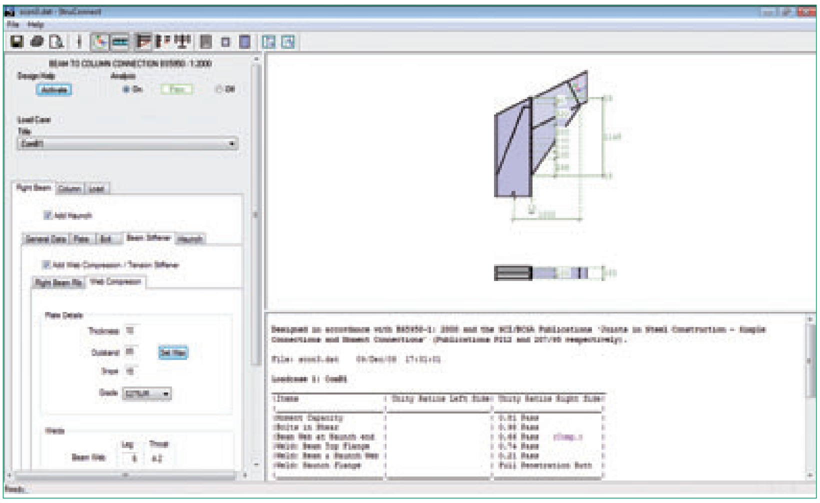
To help identify specific materials, for example where a mark number appears within StruM.I.S .NET, the associated StruCad drawing can be called upon instantly or its place in the 3D model viewed in StruWalker, an integrated and standalone viewing application from AceCad.

Once all materials have been defined, StruM.I.S .NET can also be used to manage inventory and identify what's in stock and what needs to be ordered. For whatever isn't in stock (and isn't on order) the software is able to automatically raise a purchase order and even send that data electronically to the supplier.

One of the most powerful capabilities in StruM.I.S .NET is how it manages the production process. Steel can be automatically allocated, routed and tracked around the shop floor as it is cut, drilled, and marked. A number of bar-coding options can also be used so the exact position of each piece of steel can



AceCad's viewing application, StruWalker, can be used in conjunction with StruM.I.S to provide visual feedback on construction phases and the whereabouts of specific steel members.



StruConnect, AceCad's moment connection design software.

tracked with ease.

Clients can even access live reports over the Internet to keep track of steel, and whether or not it's been delivered to site or even constructed. StruWalker can again be used to provide visual feedback on all of this including showing exactly what phase of construction a project has reached at any point in time. This can play a critical role in the decision-making process if last minute changes need to be made as their cost implication can be updated on the fly.

Conclusion

In coining the term Fabrication Information Modelling (FIM), it's clear that AceCad is looking to benefit from the success of BIM at the heart of the AEC sector. But marketing hyperbole aside, the FIM acronym actually makes a lot of sense when trying to explain what AceCad's StruCad and StruM.I.S .NET products offer the steel fabrication industry.

While Structural BIM concentrates on the engineer's role in the process, FIM takes things further to its conclusion, right down to the site erection stage.

While this has been made possible through its StruM.I.S application for some time, the introduction of the Model Manager into StruCad V15 now enables fabricators to manage their extended team much more effectively and get their fabrication modelling and detailing processes even more efficient.

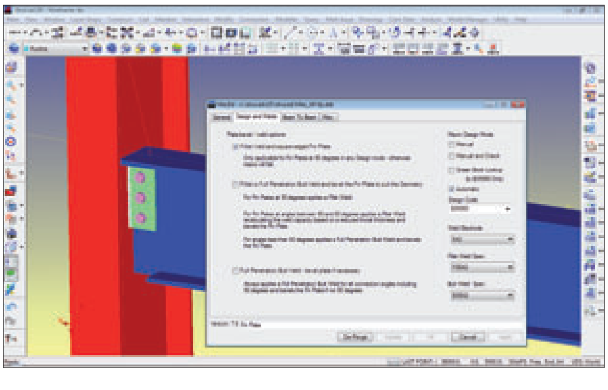
There are other products that do similar things — Tekla Structures and ProSteel on the modelling side, and FabTrol for material management — but AceCAD is the only software developer that has all of this under one roof.

By implementing StruCad and StruM.I.S together it provides greater potential to compress the fabrication process, and introduce material management for procurement much earlier on in the chain.

With over 75% of AceCad's staff having come from the steel fabrication industry and the company's software technologies honed by its key clients and its own engineering division (which it runs in parallel to its software development team), it's a tried and tested process which has already helped the efficient delivery of a wide variety of projects around the globe.

www.acecadsoftware.com

Simple connection design in StruCad designed to BS5950.



An impressive design future

As design visualisation becomes an increasingly important part of the overall design process we expect to see some impressive things at Imagina 2009, where some of the most creative firms will be exhibiting.

Design visualisations are more than just pretty pictures created to appease customers or lure lodgers and funding to a project. A lucrative industry of its own, it is a strategy that works on a number of levels, and one that architectural practices are keen to develop.

Imagina 2009, at the Grimaldi Forum, Monaco, from 4 – 6 February 2009, is set to be one of the biggest events for the 3D community. The show's general manager Laurent Puons has noted the value of a skilled 3D visualisation as part of a project, and how a transition into 3D design is increasing the level of detail and amount of uses a firm can expect to gain.

"Today, 3D has become a strategic tool in aiding decision making in all design-based professions," explains Mr Puons. "It allows information that would otherwise be impossible to represent to be displayed, helping in the analysis, expert assessment, study and promotional stages of a project. Publishers have always been particularly ahead of their time – more than ten years ago, they had already proposed innovative 3D technology. Markets are not, however, always adapted to such technological revolutions in the same way."

Yet as design has shifted towards a future in 3D the process is becoming easier. "The price and complicated nature of putting 3D design systems in place was certainly limiting in the early 1980s, but these became far more accessible from 2000, with the development of such key products as Google SketchUp and Art'lantis," says Mr Puons. "Tools were adapted and simplified, helping them to be more widely used. In the course of their evolution, it was less the products themselves and more the way in which they were viewed that delayed the development of 3D. The arrival of new generations of architects trained in 3D as part of their education helps in the growth of the 3D sector."

He admits that consumers in the past have been slow to take up new technology, but as the move into 3D races ahead, the consumer is demanding more. "Today, the situation has changed. Consumer demand determines the market, with clients becoming experts in a given field, able to tell software companies their requirements. As a result, the most successful companies are those that listen to what their clients have to say, and respond to the demands of the market," he says, adding that Imagina frequently explores the issue of Building Information Management, which "remains a key area for publishers".

Mr Puons says: "Every year, all the major companies that take part in Imagina present significant innovations and improvements that reflect the vitality of the 3D industry. Autodesk, Graphisoft, Bentley, Dassault Systèmes and Bionatics all contribute in their own way and in their respective fields to the growth and development of the 3D sector."

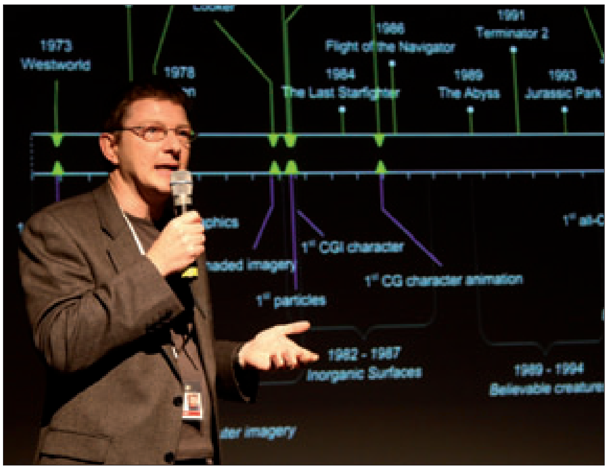


3D visualisation is 'a lingua franca that everyone can understand', says Laurent Puons, pictured.





Opening session: Imagina has been servicing the 3D sector for over three years.



Opening session: a true 3D model is a general tool that can be used by everyone.

> **"Every year, all the major companies that take part in Imagina present significant innovations and improvements that reflect the vitality of the 3D industry."**
> **Laurent Puons,** ***Imagina general manager***

Mr Puons is adamant that a true 3D model, "a general tool that can be used by everyone", has uses beyond being a pretty picture for a future plan.

"Features such as interactivity and the simulation of specific lighting or physical phenomena can only be developed by using 3D. In architecture, there can be no accurate simulation without 3D, and the accuracy of a model is integral to its credibility. The same is true of landscape planning, where only geo-referenced models allow users to develop accurate and realistic demonstrations."

Mr Puons adds that 3D visualisation is "a lingua franca that everyone can understand", eliminating the need for elaborate speeches and complicated drawings.

As an example, he cites the commonplace situation of encountering opposition to a new build. "Protests against problematic or unpopular projects are becoming increasingly significant and easier to organise. Today's citizens can contest decisions and ensure that their voices are heard in a number of ways. Almost every planning or promotional team has had projects stopped because of ill-prepared and/or poorly presented public consultations. Regardless of the nature or scale of a project, it is vitally important that designers explain their methods of analysis and proposed solutions in order to integrate their work with the surrounding environment. 3D has proven to be the strategic tool to succeed in doing this.

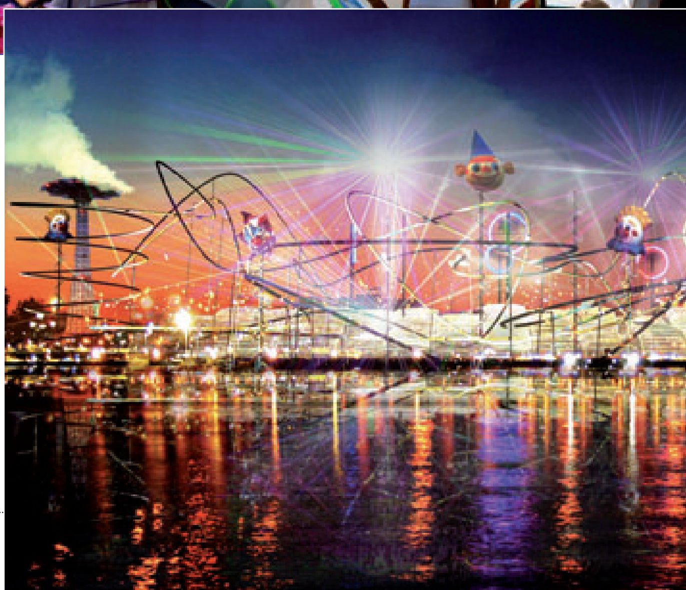
"Visualisation tools are now so highly developed that they can respond to increasingly ambitious demands from architects and urban planners," enthuses Mr Puons, before saying that Imagina this year will include conferences that highlight the important use of the technology around the world. "Visualisation has assumed a key place in any project, from its earliest phases through to final decisions," he says. "Because of the development of these tools, we are now able to visualise projects that we were previously unable to imagine.

"For over three years, Imagina has shown that 3D solutions are no longer the exclusive preserve of the media and entertainment sector," adds Mr Puons, concluding that this year's event is to be the most rewarding for the architectural sector yet. "Over the course of three days, software publishers present their latest design solutions in our exhibition hall and offer those who are present the opportunity of familiarising themselves with these new technologies in workshops and masterclasses."

AEC Magazine will be providing coverage from this year's show, bringing you the latest news and releases.

www.imagina.mc





Fantasy fairground

London design firm Squint/Opera has been tripping the light fantastic at New York's world famous Coney Island, where thrill seekers have gathered for over 100 years.



The usual fairground fodder was given a shot of adrenaline in this hyper-realistic image of Coney Island.

This bright and brash concept for the redevelopment of New York's Coney Island resort comes with a similarly colourful tag: "It's Blade Runner on acid, and you're in drag."

A combination of photo-layering and 3D visualisation, the images are the result of London-based design firm Squint/Opera's participation in the two-day, intense design workshop 'Imagine Coney'.

Organised by the Municipal Art Society, New York, the idea was to 'put a spanner in the works' of the city's plan to turn the famous Coney fairground into bland condominiums.

The team provided a shot of adrenaline to the usual fairground fodder, working with 3ds Max, Lightwave and a variety of imaging software, aiming to convey the ideas behind the workshop without going into specific design detail. "The images were meant to be suggestive not definitive, so we had to strike a delicate balance," says Jules Cocke, co-founder and director of Squint/Opera.

The two-day limit to the working process and the fanciful objectives were clearly different to their usual design process. "The images were nearer to storyboard pictures than typical architectural views," says Jules. "We created the images during a two-day design workshop, alongside teams of designers, planners, theme park experts and so on, all making it up as we went along. The process was very fluid and experimental.

"There were huge round-the-table discussions, with the team deciding what the best ways to express the ideas were. We took lots of photos around the area, and whittled those down to a few shots."

These photos provided the background to which 3D artists Nick Taylor and Tim Thornton, could build using 3ds Max and Lightwave respectively.

www.squintopera.com

The images were nearer to storyboard pictures than typical architectural views.





Squint/Opera wanted to dissuade the city from turning the famous Coney fairground into bland condominiums.

Managing the microclimate

With the help of advanced analysis software, microclimate simulation studies are having an increased impact on the design process. **Toby Sargant, Nicholas Waterson** and **Iain Bowman** from consultancy Mott MacDonald discuss how this opens up opportunities for engineers, architects and developers to work together to create more appropriate local environments.

English physicist and natural philosopher Sir Isaac Newton's third law of motion states that 'to every action there is an equal and opposite reaction'. Together with the first two laws, which cover inertia and acceleration, this forms the basis of classical mechanics and has guided the understanding of the physical world as we know it.

Newton's laws of motion may seem incongruous in a discussion about climate simulation, but in fact there are important parallels. The third law means that all forces are interactions — that there is no such thing as a force without a reaction. So, the height, shape, material and position of a new building or structure will have an effect on the environment around it. Tweak any one of those and the effect will change.

The effect of different building influences on the environment is being examined as never before by Computer Aided Engineering (CAE). Powered by the increase in computing power, and more sophisticated software, CAE now offers untold possibilities for many projects in the built environment.

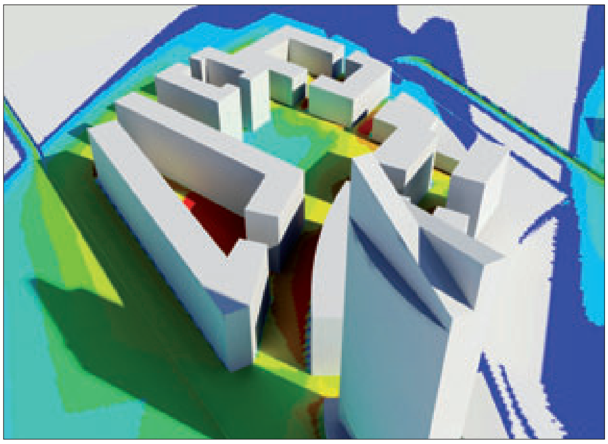
Computational fluid dynamics (CFD), for example, can offer detailed calculations of air flows both in and around complex structures and large spaces such as atria and stadia. Powerful visualisation techniques can be used to extract extra physical insights from the complex mathematical analyses for simple illustrations to the lay person.

At the same time, traditional hand calculations for assessing daylight effects are being replaced increasingly by computer simulation techniques, which are able to handle a large volume of calculations and produce colourful and accessible graphical outputs. This allows technical consultants to provide clear and concise findings to clients and planning authorities alike. The calculations involved in microclimatic studies are by their nature technical and can be misinterpreted or misunderstood without adequate presentation.

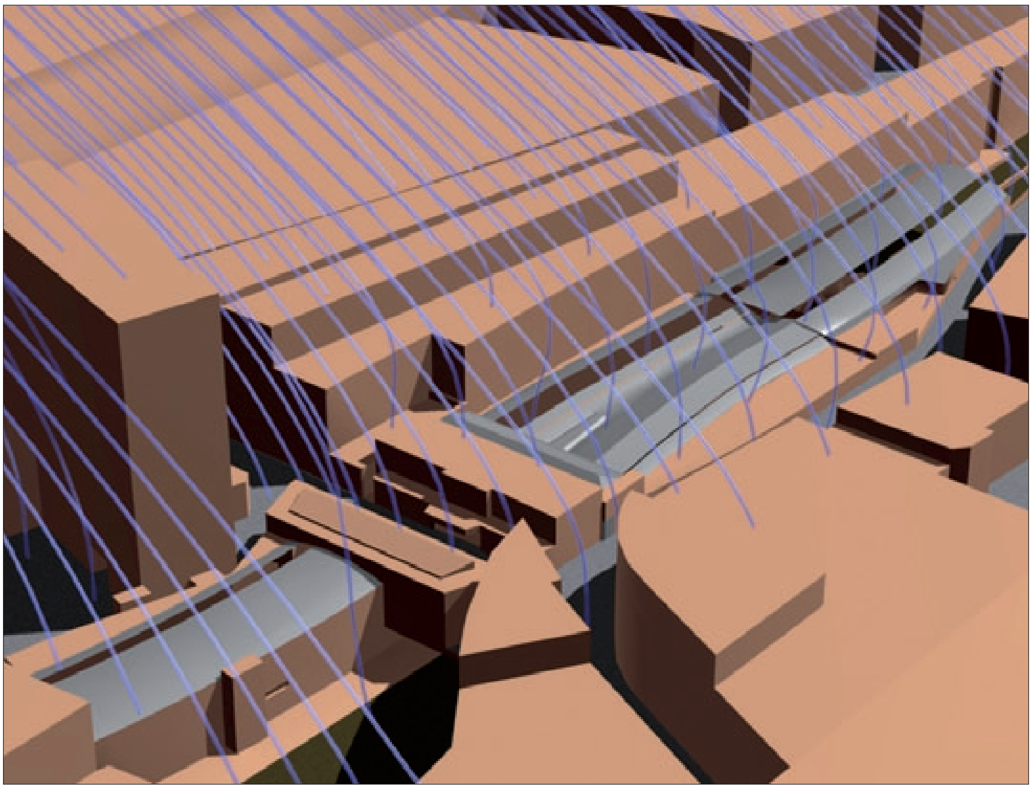
The rise in use of CAE produces some cause for thought. Successful application of CAE is not simply about computational power. Now, more than ever, it requires specialist expertise to ensure that simulations are run with careful thought regarding their purpose, as well as ensuring the accurate building of models and the appropriate representation of the physics of the problem. Such CAE analyses require the same level of preparation and clear conclusions and advice as any other complex calculations.

Winds of change

While the use of CFD techniques to predict wind loads on buildings remains problematic and controversial, their application to wind flow around groups of buildings to ascertain their effect on the ground-level wind environment is becoming increasingly well established. Analyses usually attempt to predict mean velocities close to ground level, which can then be used to assess the situation with regard to one of various sets of criteria.



Example of overshadowing and ground-level shading study.



Wind-driven rain analysis for a railway station.

The most famous classification of wind speeds is the Beaufort scale, developed originally for use at sea but which can be converted for use on land. Modern wind-comfort criteria usually include some combination of the following aspects:

- Wind speed (mean and gust);
- Frequency of occurrence;
- Activity talking place e.g. sitting in open cafes versus 'business walking'.

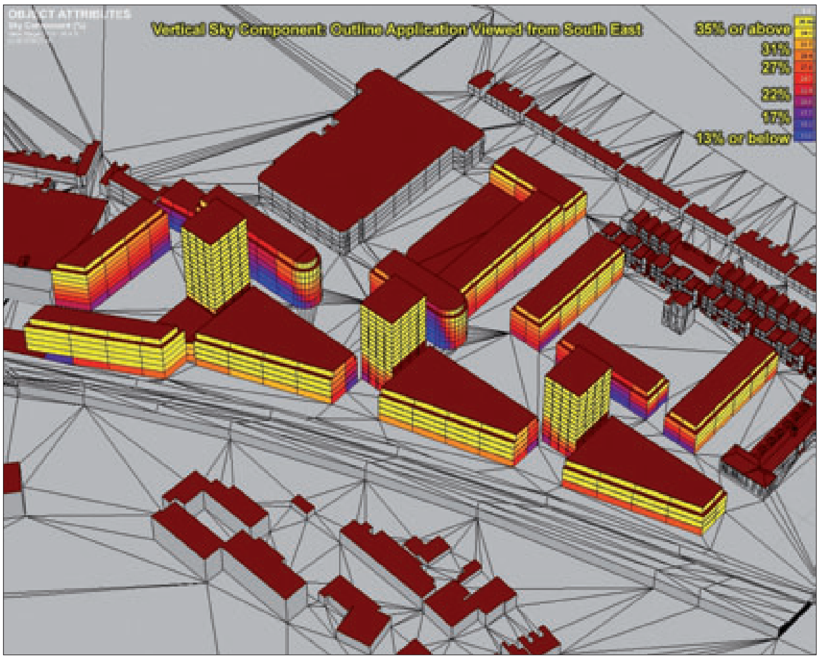
Different speeds will be acceptable dependent upon frequency and type of activity taking place. It is recognised that gusting can affect wind comfort (in addition to the basic mean wind speed), though this aspect is difficult to reproduce meaningfully in a typical Reynolds-averaged flow simulation.

The increased availability over the last decade of CFD codes, such as Ansys CFX, able to give solutions on hybrid meshes of tetrahedra, hexahedra, prisms and pyramids has greatly reduced the cost of undertaking such studies and enabled them to be used at the early stages of the design process where they can have greatest impact. Creating meaningful solutions still, however, requires care and expertise, in particular in specifying a representative atmospheric boundary layer.

Wind flow simulations have a number of other applications including:

- Wind-driven rain assessment;
- Effect of sea spray;
- Ventilation inlet/outlet positioning;
- Natural ventilation design;
- Stadium pitch ventilation;
- Pollutant and dust dispersion.

As mentioned above, the obvious application



Effects of access to daylight internally and externally to a development.

to the prediction of wind loading on buildings remains largely the domain of physical wind-tunnel simulations due to the continuing technical challenges involved.

In the spotlight

Natural lighting calculations for buildings used to be undertaken with a variety of methods, from shining lights onto scale models to producing hand-drawn Waldram diagrams and counting shaded squares. CAE tools, such as Ecotect, can now do much of this – assessing lighting characteristics of a development using recognised indices, considering both the internal characteristics of the development and the impact on the surrounding environment.

This enables designers to optimise the natural characteristics of a design. In an age of environmental awareness, this ensures the best use of natural lighting and minimises the need for artificial lighting, producing both cost and environmental savings. Often of more interest to developers, the impact of a design on the surrounding environment and neighbouring properties can be assessed and addressed, thus minimising the risk of possible litigation against them.

The Building Research Establishment (BRE) in the United Kingdom recommends the use of two specific metrics that assess the potential for good lighting afforded by windows for both direct and indirect light, namely the Vertical Sky Component (VSC) and the Annual Probable Sunlight Hours (APSH).

Alongside consideration of the buildings within a development, the shading of open spaces is also calculated. These parameters are seen as indicators and design tools, to inform the design, rather than rigid regulations that must be adhered to. If concerns are apparent in areas of the development then further investigations into Lux levels and Average Daylight Factors can be undertaken. Here we focus on the initial calculations of VSC and APSH, but similar CAE tools and methods can be used to calculate other lighting characteristics for a new development.

Sky's the limit

The Vertical Sky Component is a measure of a wall or window's access to daylight, with daylight referring to indirect or diffuse light received from the sky. A high VSC would afford a room a generally bright appearance, while a low VSC would imply a gloomy feel.

In simple terms, the VSC is a measurement of the percentage of the sky that can be seen from a vertical face of a building. When looking out of a window only 50 percent of the sky would be visible when uninterrupted by buildings. Taking into account that not all light in the sky is of equal importance, the sky model is distorted to give a maximum possible VSC value of 40 percent.

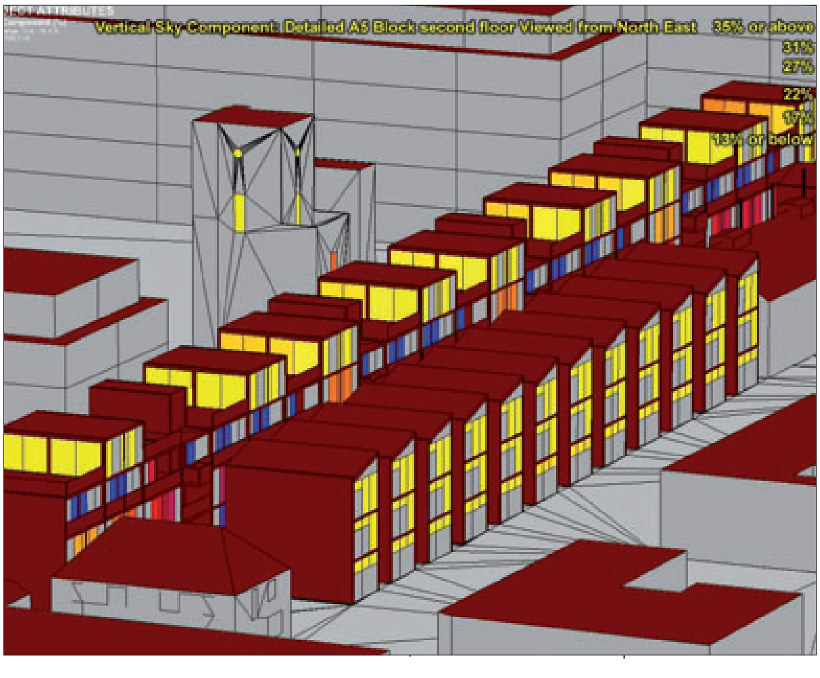
When considering the effect of developments on daylight for residential buildings, the BRE guidelines suggest that non-reception rooms such as bathrooms, toilets, storerooms, circulation areas and garages need not be analysed, and that bedrooms, while they should be analysed, are less important than other living areas in terms of access to daylight.

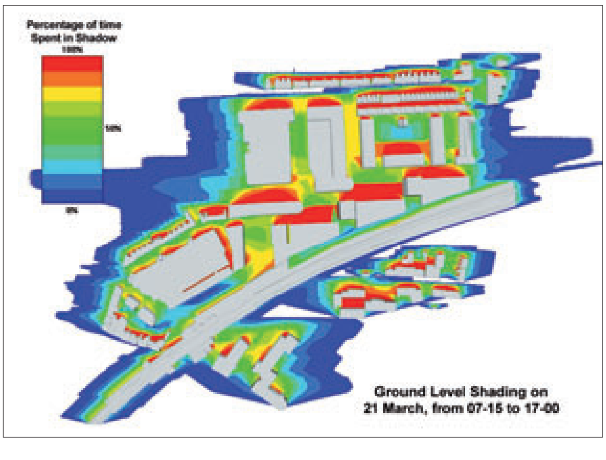
The BRE guidelines propose that: "For a room with non-continuous obstructions there is the potential for good daylight provided that the vertical sky component, at the window position 2m above ground, is not less than the value for a continuous obstruction of altitude 25 degrees. This is equal to a vertical sky component of 27 percent."

The Annual Probable Sunlight Hours (APSH) measures the access to direct sunlight, with sunlight referring to light that falls directly from the sun on a façade and is only of interest to those façades facing within 90 degrees of south. By looking at the path of the sun through the sky, calculations can be made showing the percentage of time that a façade will spend in shade.

A high APSH means the room will receive a high amount of direct sunlight. Similarly to the VSC, the BRE Guidelines suggest that sunlight is of importance in living rooms and conservatories, but is less so in bedrooms and kitchens: "British Standard recommends that interiors where the occupants expect sunlight should receive at least one quarter of annual probable sunlight, including at least 5per cent of annual probable sunlight hours during the winter months, between 21 September and 21 March."

For ground shading, the shadowing cast by the proposed development on the equinox on 21 March





Left and below: *Example results from lighting study.*

is calculated. Only sunlight from above an angle of 10 degrees from the horizon is assessed, in accordance with recommendations in the BRE guidelines: "It is suggested that no more than two-fifths, and preferably no more than a quarter, of any of the listed amenity areas should be prevented by buildings from receiving any sunlight at all on 21 March."

The method BRE suggests for the calculation of VSC is using Waldram Diagrams. In essence these are a camera 'projection' of the view seen by a façade, similar to a fisheye lens. From this the percentage of sky obscured by buildings can be calculated.

A number of modern CAE tools work using similar principles, dividing the 'sky' into blocks and calculating the number any one façade can see.

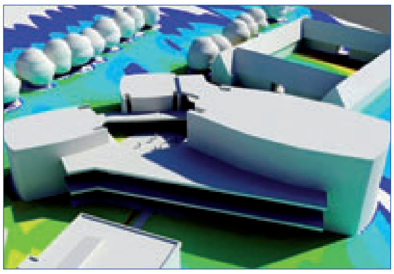
Whereas the hand-drawn diagrams of the past were costly and time consuming to produce, CAE can undertake the calculations in seconds. With the increase in speed there is also an increase in accuracy – while traditional techniques may only provide results to the nearest integer, modern CAE tools can provide results to a couple of decimal places. Similarly for direct sunlight, by specifying the location of a development, a sun-path diagram can be calculated for each façade, from which the time spent in shade can be speedily calculated.

Turning wisdom on its head

CAE tools can provide advanced analyses to inform the design process, providing more comprehensive and accurate studies than were previously possible. However, with the emergence of these relatively widely available techniques, and the associated volume of design data for clients and planners to consider, it is the advice produced as a result of the analysis

"Powerful visualisation techniques can be used to extract extra physical insights from the complex mathematical analyses for simple illustrations to the lay person."

Overshadowing and ground-level shading study.



that is more important than the results themselves. The judgements and proposed enhancements of the experienced practitioner, based on the analysis data, can bring real value to a project.

CAE analysis can help to produce improved designs. In simple cases, for example, landscaping can be modified to reduce wind speed and shading to allow a more pleasant environment. In other cases, the usage of areas in poorly lit sections or those with higher wind velocities can be changed. Where designs have serious issues then they may require more serious redesign, maybe producing radical, innovative and unexpected results, literally turning traditional wisdom on its head, such as moving living areas up in houses and bedrooms down.

Extensive redesign can be seen as being in direct conflict with commercial and other considerations. Listed buildings may need to be worked around as may transport and other key local issues. The logic behind some decisions might, however, need to be challenged. One common issue, for example, is that reducing building dimensions or profiles to create more favourable microclimatic conditions can reduce the floor space within developments, which may limit the project's commercial viability. This has to be balanced, however, against the real benefits that can be gained from such a discussion.

Is it more beneficial, and therefore more commercially viable, to have large designs with less favourable microclimatic conditions, or smaller designs with more benign ones? If areas are to be for outdoor use, which is more appealing to a potential investor: sitting in a square that is shaded and windy, or one that is sunny and calm? Developers who push ahead with the former, may find that once built the design is not the attractive proposition it seemed at the outset.

While CAE tools can help by assessing various mitigation measures, they are unlikely to be as successful as modifications made during the original design process.

Hidden within this is the lack of definitively agreed acceptance criteria. The BRE guidelines are just that, guidelines, that can be heeded or not. There is no universal agreement that the criteria that they outline are sensible or worth adhering to. These, and a lot of the right to light analyses, are based on research undertaken in the early 20th century by people like P J and J M Waldram and A K Taylor. Modern lighting tools use variations on their methods but are these methods sufficient?

Similarly for wind microclimate, there is no single set of internationally-accepted criteria and little regulatory specification, beyond an increasing recognition by planning authorities of the importance of wind effects. Even within a single country it is not unusual to find various sets of criteria in use (and indeed multiple sets of criteria referenced to the same author).

Therefore, while CAE can offer useful results, the underpinning techniques and methods of interpreting the results should always be reviewed and questioned.

Conclusions

The spread of CAE has led to better and more informed design, as well as providing planning authorities with material to better inform their decisions in building sustainable and high quality environments. The use of CAE, however, still requires expert knowledge in its application and interpretation. CAE tools in themselves cannot create the best design solutions, it is the guidance given based on their results that is important. With limited consensus on the criteria on which these judgements should be based this can sometimes prove challenging.

It is, however, beyond doubt that strong clear advice produced from CAE techniques can help us to design environments that do not just work aesthetically, but also technically, helping to produce sustainable high quality designs that satisfy the many and varying demands to which they will be subject.

www.ansys.com

simulation@mottmac.com

Right to light in Chelmsford

When the former Marconi Factory site in Chelmsford, Essex, was put out for public tender, property group Ashwell submitted a proposal to turn it into a mixed-use area to meet the business, retail and housing demands of the local area.

The majority of the nine-acre site is occupied by ageing factory buildings that need to be replaced. However, certain key buildings of historical significance are to be conserved and sympathetically refurbished as part of the design. The development is planned to incorporate a range of building usage including commercial, hotel, apartments, town houses, duplexes, retail and leisure that are linked together by a number of outdoor public open spaces. Notable additions will be the inclusion of two residential towers that will be the tallest buildings in Chelmsford.

Mott MacDonald was commissioned to analyse the environmental impact of the proposed plans. This included effect of wind on pedestrian comfort and how the new development would alter the sunlight and daylight environment for the buildings surrounding the site. Mott MacDonald was also asked to ensure the best possible use of natural lighting within the development itself. The final analysis and report of these studies formed part of the Environmental Impact Assessment, supplied to the local planning authority at the time of application for planning.

The lighting study was carried out using specialist lighting analysis software on 3D computational models that were created of the site and surrounding buildings. Brought early into the design process, Mott MacDonald was able to work closely with architects, Rogers Stirk Harbour and Partners, representatives from the Council Planning Department and the rest of the client team to inform and improve the natural light characteristics of the design as it evolved.

'Right to Light' calculations detailing the change in access to sunlight and daylight for surrounding buildings brought modifications to the plans to minimise any adverse impacts. The shade cover for amenity areas was assessed in order to ensure that they could be used by the public throughout the year. All work was carried out using careful reference to the measurements and criteria outlined by the BRE (Building Research Establishment) National Guidelines supported by the Local Planning Guidelines.

Wind data for the site was analysed to assess the frequency and strength of winds from different directions. Computational fluid dynamics (CFD) simulations were then carried out for a chosen set of wind directions and the results assessed in terms of mean wind speed close to ground level, using a set of guidelines suggested by Lawson, based on wind speed, frequency of occurrence and the usage of the space.

In this way any potential problem areas could be identified and mitigation measures suggested.

Autodesk NavisWorks

If you need to share, review, interrogate and publish multi-disciplinary 3D representations of a design in a single building model, Autodesk has a very handy tool for the job, writes **Martyn Day.**

In the dark days, when life was mainly 2D, NavisWorks, as it was written then, really was a product ahead of its time. At the core of the software was an interactive 3D technology to enable design reviews for AEC CAD users. It could import 3D data from multiple formats, including DWG, DGN and 3ds Max, and display the complete construction in a single light-weight model. At the time there was nothing like it on the market and, in some way, the product helped provide an independent platform where related project information could be collated, even if created in disparate and competing CAD systems.

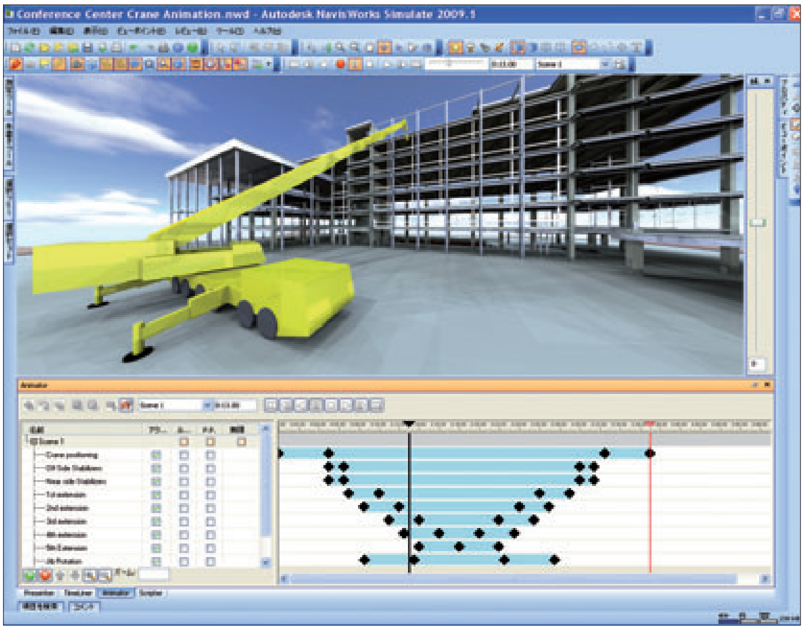
Of course, once all the information had been loaded there were all sorts of fringe benefits, beyond visualisation, such as clash detection, tolerance checking, design reviews and project co-ordination across all multi-discipline project team members. It could even display products in so-called 4D - the fourth dimension, time — displaying construction or demolition of projects throughout the build/decommissioning cycle. And there was another benefit, it could run on a laptop or PC, yet manage really large models. NavisWorks really was a product that was waiting for the industry to catch up with it.

That happened in May 2007 when Autodesk acquired NavisWorks, seeing a product which would greatly help its customers leverage their 3D design data and enable better design and construction decisions. In little over a year Autodesk has accelerated its development into four flavours, depending on each project participant's needs: Autodesk NavisWorks Manage, Autodesk NavisWorks Simulate, Autodesk NavisWorks Review, as well as the free viewer application Autodesk NavisWorks Freedom.

NavisWorks Simulate software visualises designs and accurately models '4D', simulating the complete schedule for construction managers. Literally you get to see the building phases as scheduled. Here potential on-site problems can be identified and co-ordination sorted, improving productivity and quality by enabling precise previsualisation of construction projects. The rendering engine provides the opportunity to evaluate and verify the materials and textures appropriate to the intended design.

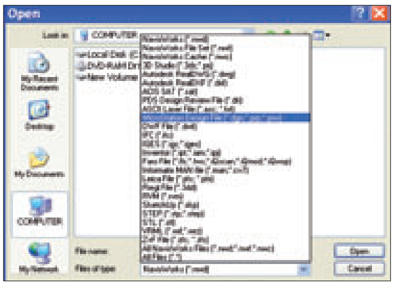
A selection of formats supported

AutoCAD (dwg, .dxf, .sat), MicroStation (SE & J .dgn .prp .prw), 3D Studio (.3ds .prj), DWF(.dwf), Faro (.fls .fws .iQscan .iQmod .iQwsp), IFC (.ifc), IGES (.igs .iges), Inventor (.ipt .iam. ipj), Leica (.pts .ptx), PDS Design Review (.dri), SketchUp (.skp), STEP (.stp .step), STL (.stl)



Here NavisWorks is creating an animation of a crane on-site. This could be used to ensure the right size crane is ordered and the best position for the particular build phase.

The ultimate version is NavisWorks Manage, which provides the complete set of NavisWorks tools for running construction projects. The software features: photorealistic visualisation of all types of models, precise replication of designs (accurate enough for measurement), comment and markups, live links for databases, file or streamed distribution of models, simulation of 4D construction schedules and powerful clash detection. The clash detection works with any specified geometry and can be used to search for potential conflicts while evaluating design options. It can also be used to compare as-built laser scans of a building with the original CAD model. There's a built-in audit trail tool that keeps tabs on conflicts and resolutions, with full reporting capabilities.



NavisWorks can import geometry and data from multiple common systems. Here a Microstation .DGN is being loaded.

NavisWorks Review is designed for whole-project visualisation, being able to import models from all types of systems, regardless of format or file size, creating a single data model. In this synchronised environment, designs can be explored, assisting client/contractor understanding of project geometry and embedded component information. The software features collision detection, gravity, and a 'third-person' for interactive walkthroughs. Animations can be quickly created then converted to movie format, and viewpoints can be saved as still pictures. Cross-sectioning, markup, measurement, and text overlay are also available, together with the ability to 'play back' content created in NavisWorks Simulate.

NavisWorks Freedom is a free viewer for files created in NavisWorks (NWD format) or Autodesk's web-standard DWF format. All simulations and project views, including model hierarchy, textures and materials that are stored in these files can be distributed, shared and explored in real-time, using the full set of navigation tools.

Conclusion

Obviously NavisWorks is a great partner tool for Revit and other 3D tools, but its ability to bring in data from many other systems, to produce a single unified model, is a massive benefit in the dislocated way in which construction projects tend to be run. So, NavisWorks is now a group of tools that can provide big benefits on multiple levels; a single environment to aid design reviews, collaboration and will quickly help anticipate potentially expensive on-site problems and give clear indications as to the viability of construction method and schedule. With the increasing use of 3D and adoption of BIM and the new challenges that they bring to the design process, it appears that the industry has finally caught up with the original NavisWorks concept and it's now a crucial co-ordination tool.

Software review

Product: NavisWorks Manage

Supplier: NavisWorks

Price: the full package is €9,900

Link: www.navisworks.com

Supermodels

Henning Larsen Architects in Denmark is pioneering the use of 3D printing to create detailed models at all stages of the design process.



Architects are trained to conceive of their designs in 3D. To impress a potential client or a panel of judges, it helps to have a finely detailed model to communicate concepts clearly. It also helps to be able to create detailed models throughout the entire design phase of a new project, so that engineering problems can be rectified early on, reducing the number of errors that go undetected beyond the early stages.

Making models can be expensive and time consuming using traditional methods, especially when innovative designs use complex shapes and forms. Today, leading architects are discovering an entirely new technology that changes the game – 3D printing. A 3D printer creates a detailed physical object from 3D design data much as an office printer creates documents from word-processing files.

Henning Larsen Architects (HLA) is a world-renowned architectural firm based in Copenhagen, Denmark. Together with fellow Dane Jørn Utzon (designer of the Sydney Opera House), HLA founder Henning Larsen has helped to establish Denmark as a leader in contemporary architecture. He is the creative genius behind landmarks around the world, such as the Danish Embassy in Riyadh, the Copenhagen Opera House and the Roland Levinsky Building at the University of Plymouth, UK.

To help to push the boundaries of architectural design, HLA continually improves its model making process by investing in the latest 3D model making technology.

Using its new Z Corporation ZPrinter 450 3D printer means that HLA can make precision models in less than a day, which would have once taken weeks to complete. “The machine has created a much closer link between the physical and the digital world, allowing us to print component parts in colour and construct models of buildings in 3D from the very beginning of the process,” said Morten Steffensen, an engineer at HLA.

The ZPrinter 450 enables Henning Larsen’s architects to print shapes that are challenging to make by hand, such as double curving surfaces and intricate or finely detailed elements such as staircases, for example.

“Since installing the ZPrinter 450, HLA has refined and enhanced its 3D model making process and reduced model build time and cost,” added Steffensen.

The firm took delivery of its ZPrinter 450 in January 2008. “We’re told that the machine has the fastest output speed of any 3D printer; five times greater than similar systems in the same price category. We can even build multiple models at the same time by stacking and nesting parts,” said Steffensen.

Models can take between an hour and 12 hours to print depending on how much detail is included in the original CAD file. The ZPrinter 450 automates many processes, meaning that operator touch time for setup and model removal is reduced. Time-saving machine functions include automated setup and self-monitoring as well as automated powder loading and recycling. The ZPrinter 450 has been created for the front-office environment and has been designed to operate quietly, to use safe build materials and produce zero liquid waste.

“The machine has created a much closer link between the physical and the digital world, allowing us to print component parts in colour and construct models of buildings in 3D from the very beginning of the process.”

Morten Steffensen, ***engineer, HLA***



Scale model of the Reykjavik Concert and Conference Centre, made using the Z Corporation ZPrinter 450 3D printer. The interior of the Reykjavik model was printed on the Z Corp ZPrinter 450 and the skin of the building was laser cut.

HLA acquires many of its commissions by winning design competitions, including that to build the prestigious Reykjavik Concert and Conference Centre, Iceland, which is under construction and due for completion in 2009.

“We use 3D printed parts together with laser cut parts and handmade elements to build models for competition entries,” said Mr Steffensen. “Like the Reykjavik Conference Centre, they are typically quite complex and help to clearly communicate our ideas at the earliest stages of the competition process.”

The interior of the Reykjavik model was printed on the Z Corp ZPrinter 450 and the skin of the building was laser cut.

“We were able to print two batches of interiors at a time on the ZPrinter 450,” said Steffensen. “The entire model takes between 12 and 14 hours to print, plus assembly time.”

Build-time is only one consideration when creating a model. Another is precision, which is where the ZPrinter 450 has really benefited Henning Larsen.

“Whether it’s a competition or a project bid, there’s limited opportunity to get ideas across, so we need all the help we can get. Thanks to 3D printing our models are more refined and more precise, which gives us an advantage. There’s no doubt that beautiful models help us to win commissions,” said Steffenson.



Design visualisation: Henning Larsen acquires many of its commissions by winning design competitions, including that to build the prestigious Reykjavik Concert and Conference Centre, Iceland, which is under construction and due for completion in 2009.

According to Steffensen, building legislation in the EU will soon demand that architects produce multiple 3D models from early on in the design process. "There are a number of legislative initiatives underway in the EU and its member states that seek to increase the use of digitalisation in the building process," he said. For instance, in HLA's home country of Denmark, all buildings with a projected construction cost of more than €4 million must have their design produced as a physical 3D model before a contract can be awarded.

The aim of the legislation is to reduce the number of potential snags during the construction of a new structure building.

It also means that any company wishing to bid on a project will have to invest in — or have regular access to — a 3D model printer.

www.henninglarsen.com





HP xw4600

The xw4600 is an entry-level workstation by positioning, but this configuration from HP offers top-notch performance for CAD, writes **Greg Corke.**

The xw4600 used to be HP's entry-level workstation. That was until it introduced an even more cost effective machine, the xw4550. However, while the AMD Opteron-based xw4550 is all about offering good performance at a highly competitive price, the Intel Core 2-based xw4600 is able to reach the computational heights of its bigger brothers, the xw6600 and xw8600 and still offer great value for money. That sounds too good to be true, you might say. What's the catch? Well, it all boils down to what you want to do with your workstation.

Unlike the xw6600 and xw8600, the xw4600 is a single socket workstation. This means it only supports a single CPU instead of two, but because you get two or four processors built into a Core 2 Duo or Core 2 Quad you still get a multi-processor workstation without paying a premium for the second socket.

You only really need a dual socket workstation (up to eight cores) when you get serious about design visualisation or simulation. Most CAD applications only take advantage of one or two cores, so by and large the most important consideration when buying a workstation for CAD is having a large clock speed. As a rule of thumb, anything over 3.0GHz is fast.

With this in mind an HP xw4600 with a 3.16GHz Intel Core 2 Duo E8500 is an excellent starting point

"Most CAD applications only take advantage of one or two cores so by and large the most important consideration when buying a workstation for CAD is having a large clock speed."

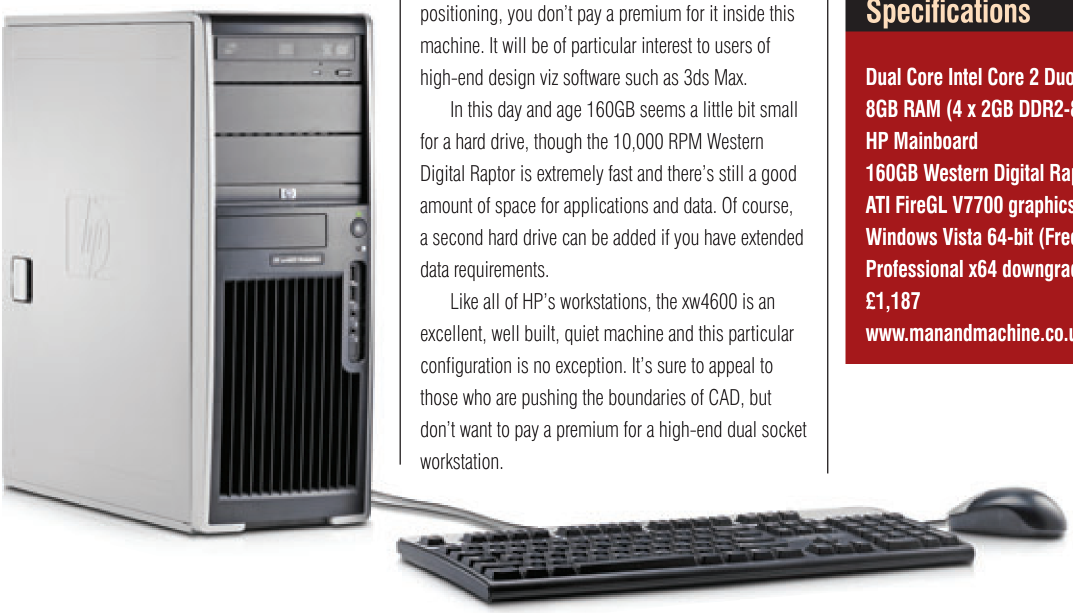
for a high performance CAD machine. But what else does this particular configuration offer?

With 8GB DDR2 memory, the xw4600 offers huge capacity for giant models. In fact you'd be hard pushed to find an architectural/engineering firm that will reach this limit. To be able to utilise this amount of memory you will, of course, need a 64-bit Operating System, and as Microsoft continues to experience low customer demand for Windows Vista in the workstation sector, the xw4600 ships with a free downgrade to Windows XP x64 enabling customers to move to Vista when they are ready.

In terms of graphics, the machine is fitted with an ATI FireGL V7700. This was the last of the ATI FireGL cards to be launched before AMD rebranded to ATI FirePro this summer, so despite its high-end positioning, you don't pay a premium for it inside this machine. It will be of particular interest to users of high-end design viz software such as 3ds Max.

In this day and age 160GB seems a little bit small for a hard drive, though the 10,000 RPM Western Digital Raptor is extremely fast and there's still a good amount of space for applications and data. Of course, a second hard drive can be added if you have extended data requirements.

Like all of HP's workstations, the xw4600 is an excellent, well built, quiet machine and this particular configuration is no exception. It's sure to appeal to those who are pushing the boundaries of CAD, but don't want to pay a premium for a high-end dual socket workstation.



Looking to the future

As soon as one technology gets established, along comes another, and the one that's currently knocking on the door is Intel's Core i7 processor, based on its brand new 'Nehalem' architecture.

On paper the Core i7 looks like an extremely exciting technology, which in the longer term will replace Intel's Core 2 architecture. It features an integrated memory controller where memory is directly connected to the processor, a turbo mode, which allows it to switch off unused cores and increase the clock speed of others. It also marks the return of hyperthreading, which uses spare CPU cycles to create additional logical cores.

It's hard to say if one should wait for this technology as the Core 2 Duo is still an excellent processor and more importantly, there are some fantastic deals to be had including this current configuration on the xw4600. Look out for more information in the January/February edition.

Specifications

Dual Core Intel Core 2 Duo E8500 (3.16GHz)
8GB RAM (4 x 2GB DDR2-800 memory)
HP Mainboard
160GB Western Digital Raptor (10,000RPM)
ATI FireGL V7700 graphics card (512MB)
Windows Vista 64-bit (Free Windows XP Professional x64 downgrade)
£1,187
www.manandmachine.co.uk

